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EXPERIMENT STATION RECORD.

L. XXVII.

SEPTEMBER, 1912.

No. 4.

The act making appropriations for the support of the Federal Department of Agriculture for the fiscal year ending June 30, 1913, noteworthy for its continuance of the general policies of recent years. Despite a general tendency for retrenchment wherever possible in the public service, no line of work now under way by the Department has been discontinued. The great majority of its projects are maintained on their present basis. Opportunity for additional development has been provided in several cases, and a few new undertakings have been authorized. This outcome may be regarded as especially significant and encouraging, indicating a sustained interest by the people of this country in the work of the Department as a whole, and a widespread realization of the importance of its interrupted continuation.

The new appropriation act was not passed until August 10. During the interval of nearly six weeks which followed the termination of the preceding fiscal year on June 30, the maintenance of the Department, as well as of most other branches of the Government, was provided for by the passage of special resolutions extending the appropriations, under certain restrictions, on the basis of the act of the previous year.

The aggregate carried by the act is \$16,651,496, which exceeds that of any year except the one immediately preceding, when the total appropriated was \$16,900,016. In the absence of serious forest fires, however, the reduction as compared with 1912 will be more or less nominal, since there has been a diminution from \$1,000,000 to \$200,000 of the fund for fighting forest fires in the National Forests in cases of extraordinary emergency. If this item is disregarded, there is an actual increase of \$551,480 for the routine work of the Department, and a considerable increase over the original estimates submitted.

In its general form the law conforms closely to its immediate predecessor, but in addition to the provisions of a routine nature it contains considerable new legislation. This is particularly the case as

regards the National Forests. The Secretary of Agriculture is directed to select and segregate as soon as practicable all lands within the boundaries of such forests that may be opened to settlement and entry under the homestead laws applicable thereto. The sum of \$25,000 is appropriated for this purpose, together with \$35,000 additional for the survey and listing of lands within the reserves chiefly valuable for agriculture. Additional provision is also made for timber sales to settlers. The purchase of lands under the Appalachian Forest Reserve act of 1911 was aided by legislation making available until expended any balances remaining on June 30, 1912, and in succeeding years, and a new appropriation of \$32,590 was granted for the maintenance of forest lands acquired under that act.

It will be recalled that by a clause in the appropriation act of May 23, 1908, 25 per cent of all receipts from each forest reserve is paid to the State in which the reserve is situated, to be expended, as the legislature may prescribe for the benefit of the public schools and public roads in the locality. An additional 10 per cent of the receipts is now to be expended by the Secretary of Agriculture for the construction and maintenance of roads and trails within the respective National Forests in cooperation, if deemed practicable, with the State authorities.

By another new clause the sanitary provisions of the meat-inspection act of 1906 are extended to include renovated-butter factories. The Department is authorized to undertake experiments in the breeding of horses for military purposes, and to study the rearing of fur-bearing animals. A national game preserve is established within the Wind Cave National Park, in South Dakota, as a permanent range for a herd of buffalo to be presented to the United States by the American Bison Society, as well as for other native game animals, and an initial appropriation of \$26,000 is made for buildings, fencing, and the procurement of a water supply. A similar reserve of 2,500 acres is provided in Wyoming as a winter refuge for elk, \$45,000 being made available for the purchase of land and its equipment and maintenance.

Provision is again made for the investigation of the cost of food at the farm and to the consumer. In addition the Secretary is directed to collect information as to cooperative and other systems of marketing farm products in vogue in this country, and to make recommendations regarding further investigations of these and related questions.

An appropriation of \$10,000 is provided for an exhibit by the Department illustrative of investigations, products, and processes relating to farming in the subhumid region, to be made at the next International Dry Land Congress, which will be held at Lethbridge,

Liberty, in October. An exhibit is also to be prepared for the Fifth International Corn Exposition, to be held at Columbia, S. C., from January 27 to February 9, 1913.

The continued spread of the chestnut bark disease, for combating which \$5,000 was granted last year, has led to an increase of the fund to \$30,000. It is provided that \$10,000 of this sum is to be expended in the study of the relation of insects to the disease.

Provision for rental of quarters in the District of Columbia is made in a special clause carrying \$95,329. A portion of this sum will be utilized for the rental of a modern six-story office building now nearing completion on ground practically adjoining the present laboratory buildings of the Department. The first four stories of this structure will be divided among several offices of the Bureau of Plant Industry which do not require laboratory facilities, and the remainder will be occupied by the Office of Experiment Stations, housing all of its activities except its nutrition investigations.

About one-tenth of the total appropriation is allotted to the Weather Bureau, which receives \$1,619,680, an increase of \$19,430. There is considerable readjustment of the various allotments, but it is expected that the increase will permit of additional employees and the more complete distribution of storm and frost warnings in connection with the protection of orchards and other crops. For the investigations in climatology and meteorology the previous allotment of \$120,000 is reduced to \$115,000.

The Bureau of Animal Industry also receives an enlarged appropriation, its total being \$1,670,316. This, of course, does not include the permanent appropriation of \$3,000,000 per annum provided for the Federal meat inspection in the act of 1906. The fund for inspection and quarantine work is slightly increased to provide for the maintenance of the recently acquired quarantine stations at the ports of Baltimore and Boston, and for the further extension of the work in the eradication of tuberculosis in domestic animals. The Dairy Division will receive \$177,900, this including a net increase of \$28,500 for the maintenance of the dairy work at the experimental farm at Beltsville, Md., the extension of the market milk and other educational work, and studies of the utilization of creamery by-products. The allotment for cooperative experiments in animal feeding and breeding is doubled, the increase of \$50,000 being in connection with a new project for experiments in breeding horses for military purposes. Increasing difficulty is reported by the War Department in securing remounts of the special types desired. Under the plan proposed the Government will purchase stallions of suitable type for the service in a number of districts, retaining under these conditions an option for the War Department on the foals. The remaining an-

appropriations of the Bureau are continued on essentially the present basis, \$52,180 being available for other investigations in animal husbandry, \$250,000 for the cattle tick eradication campaign, \$78,600 for the study of animal diseases, and \$16,500 for additional buildings at the Bureau farms.

The largest increase accorded to any bureau was received by the Bureau of Plant Industry, the total appropriation being \$2,323,880, as compared with \$2,061,686 in 1912. There is some readjustment of administrative details, but the majority of the projects are provided for much as before. The Congressional seed distribution, which is continued on the usual basis, will receive \$226,940, and \$58,740 will be available for the introduction of seeds and plants from foreign countries. There is also an appropriation of \$52,480 for the testing of special seeds and plants, of which \$40,000 is an increase for the purchase and distribution of drought-resistant field seeds, and \$23,530 is provided for seed inspection. The pathological work of the Bureau receives specific allotments of \$117,185, in addition to the appropriation for the chestnut bark disease already referred to.

The testing and breeding of fibrous plants has been extended to include work with flax straw in cooperation with the North Dakota College. Grain production and handling will receive \$136,405. The expenditure of \$8,000 for the purchase of spinning machinery is authorized in connection with studies of the ginning, handling, and grading of cotton. Other allotments are \$86,015 for pomological work, \$30,380 for studies in crop physiology, \$26,145 for soil bacteriology and plant nutrition investigations, \$33,300 for crop acclimatization work, \$46,930 for work with drug plants, poisonous plants, and tea culture, \$10,010 for crop technological and fiber plant studies, \$15,655 for physical investigations, \$26,630 for studies of methods of tobacco production and handling, \$20,000 for the improvement of forage crops, \$35,795 for work with sugar-producing crops, \$21,930 for grazing investigations, and \$49,930 for the maintenance of the greenhouses and the Arlington Experimental Farm.

The development of agriculture in the arid and semiarid regions was one of the objects to receive increased attention. The allotment for the study of dry-land methods was increased to \$125,000, of which \$50,000 will be available for the purchase and equipment of an experimental farm in the northern section of the Great Plains area to demonstrate the adaptability of agricultural and horticultural crops to the semiarid region. The studies in connection with the utilization of lands reclaimed under the Reclamation Act and similar areas were also continued with an allotment of \$62,600, and specific authority was given the Bureau to conduct investigations in connection with western irrigation agriculture. Provision was also made

for the continuance of studies undertaken several years ago of the methods of clearing logged-off lands, the testing of powders in clearing them, and the utilization of the by-products, \$5,000 being granted for the work. To investigate potato breeding and sugar-beet seed production for irrigated lands, a special appropriation of \$10,000 was made.

Great interest was also evinced by Congress in those phases of the Department's work dealing with farm management, and there was evident approval of efforts to extend to the country as a whole practical demonstrations of improved methods of farming. The well-known work inaugurated by the late Dr. S. A. Knapp in the South was continued with an appropriation of \$332,960, and its scope was broadened that in future the entire cooperative demonstration enterprises of the Bureau in the South may be conducted under its auspices. In addition, appropriations were made aggregating \$300,000 to "investigate and encourage the adoption of improved methods of farm management and farm practice and for farm demonstration work." This appropriation is under the administration of the Office of Farm Management of the Bureau, and will more than double the funds at its disposal. It is announced that a portion of this large increase will be utilized in the extension and development of the investigation work of the Office, which is now covering a wide range of activity. The act itself provides that \$10,000 may be used in the investigation and utilization of cacti and other dry-land plants as food for stock, and other projects already under way or contemplated include the collection of data pertaining to the cost of various farm operations, the carrying on of farm surveys, the relation of climate to various farm enterprises, the effect of various types of farming on the maintenance of soil fertility, etc.

In the main, however, opportunity will be afforded to extend the demonstration phases of the work and thereby to establish closer relations with the individual farmer than ever before. Already, as is generally known, the Office has a well-developed system of organization, in which a State or group of States constitutes an administrative unit or district, in charge of an expert familiar with its needs in a broad way. In many cases cooperation with the agricultural colleges and experiment stations, county organizations, boards of trade and other commercial bodies, and many other agencies has permitted of numerous smaller divisions. The county unit has been established in several instances and has been found especially effective because of the opportunity for personal acquaintance and close familiarity with local conditions. Obviously little more than a beginning toward so detailed an organization as this can be expected, even with the enlarged appropriation, but the extension which will be possible

is expected to be of much assistance to the localities which can be reached thereby.

The largest allotment to any one bureau was made, as usual, to the Forest Service, although its appropriations show a reduction from \$5,533,100 to \$5,343,045. A cut of \$100,000 was made in the allotment for permanent improvements, for which \$400,000 will be available; one of \$90,920 in that for statutory salaries and one of \$43,000 for supplies, together with smaller reductions for several lines of investigation. The bulk of its appropriation will, of course, be expended in the maintenance of the National Forests, but there will also be available \$20,180 for range studies, \$165,640 for reforestation work in National Forests and experiments relating thereto, \$83,723 for silvicultural and dendrological experiments, \$31,360 for miscellaneous forest investigations and the preparation and dissemination of results, and \$170,000 for investigations of methods for wood distillation and preservation, timber testing, and wood utilization for paper making and other purposes. Special attention is to be directed to studies of the availability for distillation purposes of Douglas fir and other northwestern species of fir and timber. The appropriation of \$150,000 for fighting forest fires and similar emergencies was continued unchanged.

The appropriation of the Bureau of Chemistry was enlarged to \$968,940, of which \$25,000 represents an increase in connection with the enforcement of the Federal Food and Drugs Act of 1906. An additional inspection laboratory is being installed at San Juan, P. R.

The Bureau of Soils received an increase of \$41,520, mainly for soil surveys and fertilizer investigations, making its total \$301,420. The soil-survey work received \$165,000, and a provision carried in the last act restricting to 10 per cent expenditures in any one State was omitted. The investigations of the sources of natural fertilizers, begun last year and carried on with special reference to potash, were continued, and the appropriation was doubled, making \$25,000 available for the purpose. Studies of the relation of soils to drainage and seepage waters were also authorized, with an appropriation of \$5,000.

Although the estimates of the Bureau of Entomology called for \$601,920 as during the previous year, its appropriations reached a total of \$672,340. Of this increase \$35,000 was provided for a campaign against the much dreaded Mediterranean fly, which is causing considerable damage in Hawaii and much uneasiness to horticultural interests on the Pacific coast. The remaining increases were for studies of insects affecting cereal and forage plants, including the alfalfa weevil, and of insects affecting truck crops, sugar beets, and stored grains, and other products. The campaign against the gipsy and brown-tail moths was continued, no change being made in its appropriation of \$284,840.

The Biological Survey will receive \$191,400 as compared with \$138,000 in 1912, its increases being mainly for the administration of the additional game preserves already mentioned. A special allotment of \$3,000 is made for the destruction of ground squirrels in the National Forests in California. The general appropriation for biological investigations and the mapping of life zones was reduced from \$20,000 to \$10,000.

The various activities of the Office of Experiment Stations were continued, and in several cases with slightly enlarged appropriations. The total is \$1,871,700, of which \$1,440,000 is allotted to the State experiment stations under the Hatch and Adams Acts. Of the remainder \$58,840 is for statutory salaries, \$38,400 (a net increase of \$2,500) for general expenses, and \$15,760 (an increase from \$10,000) for the agricultural education service. The Alaska, Hawaii, and Porto Rico stations will again receive \$30,000 each, and the Guam Station \$15,000.

The nutrition and drainage investigations each received small increases, the former being allotted \$16,000 and the latter \$100,000. For irrigation investigations \$98,300 was granted, and a special investigation was directed of the feasibility and economy of irrigation by the reservoir system in western Kansas and Oklahoma.

The Office of Public Roads will have at its disposal \$202,120, an apparent increase of \$41,400. This increase will permit of additional assistance in meeting the rapidly growing demand for advice upon road construction and maintenance, and especially for additional field experiments in road making, road materials, and related questions.

A small increase is provided for the Bureau of Statistics, which will receive \$240,680. The inquiries already mentioned as to marketing methods are included in the allotments of this Bureau.

The work of the remaining branches was continued much as at present, but with small increases in each case. The Office of the Secretary is given \$292,280, the Library, \$41,280; the Division of Accounts and Disbursements, \$104,620; and the Division of Publications, \$219,700; and the fund for contingent expenses is \$106,066.

In connection with the appropriations included in the act itself reference should also be made to the funds derived in other ways. Mention has already been made of the permanent appropriation of \$3,000,000 for the meat-inspection work and to the annual appropriation of \$2,000,000 for the purchase of lands under the Appalachian Forest Reserve Act. There are also available until expended an appropriation of \$200,000 for the protection from fire of forested watersheds of navigable streams, to be expended in cooperation with the States upon request, and a small appropriation for the feeding

of elk in Wyoming. The appropriation for the Department printing and binding is carried in the appropriation act for sundry civil expenses, the allotment for 1913 being \$475,000, an increase of \$5,000. The Post Office appropriation act contains an appropriation of \$500,000 for expenditure by the Secretary of Agriculture in cooperation with the Postmaster General in studies of the possibilities of increasing the efficiency of the rural free delivery of mail by improving the condition of the roads, and conditional upon the raising by the States or local communities of double the Federal allotment. There should also be added \$25,000, included in an act approved August 20, 1912, providing for the inspection of imported nursery stock, a number of small deficiency appropriations, and an emergency appropriation of \$5,000, which went into effect July 30, for work in exterminating the army worm which has been causing considerable devastation to crops in the Southern States.

Eliminating the deficiency appropriations and the indefinite appropriations for watershed protection and elk feeding, the grand total for the Department and the State experiment stations becomes \$22,656,496. This is a considerable sum, although it will probably represent less than one-quarter of 1 per cent of the value of the farm crops of the year. When it is recalled that large appropriations will also be available for agricultural education in the land-grant colleges under the Morrill and Nelson Acts, for the rural education work of the Bureau of Education, demonstration work in agriculture among the Indians, certain phases of the census work of direct agricultural interest, and the payment of the country's quota toward the support of the International Institute of Agriculture, the wide extent to which the principle of Federal assistance to agriculture is being carried into practice becomes apparent. The further fact that most of the lines of work are provided for solely by annual appropriations and yet are being steadily continued, and in many cases still further augmented, indicates an increasing recognition of the benefits accruing to the country as a whole from a consistent and uninterrupted fostering of its agricultural development.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Studies on malic acid.—I. The transformation of malic acid to sugar by the tissues of the maple (*Acer saccharinum*), W. R. BLOOR (*Jour. Amer. Chem. Soc.*, 34 (1912), No. 4, pp. 534-539).—With a view to determining whether the tissues of the maple tree were capable of transforming malic acid into sugar, tests were made with neutral calcium malate obtained by twice recrystallizing "sugar sand" acid calcium malate obtained by precipitating half the calcium from the neutral malate by means of oxalic acid and recrystallizing the product, malic acid obtained by removal of all the calcium from the crude neutral malate by oxalic acid (this product contained a small amount of cane sugar as an impurity), and pure malic acid obtained by precipitation of all the calcium from the neutral calcium malate. As it was believed that the transformation would be greatest in those parts of the tree showing signs of life at the time of the sap flow, viz, the swelling buds and shoots, aqueous extracts of these parts were made and the malic acid preparations added. Blanks were also prepared containing no malic acid, some solutions of the tissues were exposed to sunlight for certain periods of time, others kept in darkness, and other lots of tissues extracted with water or boiled. The amount of acidity and sugar was determined in each case.

The results showed that with the shoot tissues mixed with malic acid or malates and exposed to sunlight a diminution of acidity and an increase in reducing substances took place. This was interpreted as a transformation of malic acid into sugar. "A less pronounced change of the same kind is produced in darkness at 38°. The active principle which produces the change is somewhat soluble in water, is destroyed by boiling, and is therefore probably of enzym nature. The tissue of maple buds similarly treated brings about a decrease of reducing substance and an increase of acidity in solutions of malic acid or its salts."

The chemical composition of the substances contained in the birch, G. FRASSER (*Collegium*, 1911, Nos. 484, pp. 393-402; 485, pp. 405-412; 486, pp. 418-420; 487, pp. 421-425; *abs. in Jour. Soc. Chem. Indus.*, 30 (1911), No. 24, p. 1462).—The author treated the residue obtained from the alcoholic extraction of 2 kg. of leaves from the white birch (*Betula alba*) with cold alcohol, ethyl ether, and dilute caustic potash solution and sulphuric acid, purified the constituents by further treatment, and observed their solubility in various liquids, together with their behavior with various reagents.

"The fraction of the extract dissolved by ether contained a wax-like, dark green mass of a resinous character, soluble in petroleum ether, which was found to have the composition $C_{26}H_{40}O_2(OH)COOH$, and yielded substitution products with metallic salts of the type $C_{26}H_{40}O_2(OH)COO.Cu.COO(OH)O_2H.Cu$. The ethyl ester and also the acid chlorid and amid were prepared from it. By oxidation with fuming nitric acid, butyric acid was produced.

"The research showed that the substances which can be isolated, particularly from the young leaves of the birch consist principally of a resin, besides tannins of the pyrocatechol group and indifferent coloring matters. The absence of betulin and other glucosides in the leaves shows that these are derivatives of the compounds found and occur in older parts of the plant and particularly in the bark. The dry distillation of the resin from the leaves yields an odorous oil similar to that obtained from the bark, which shows that it has already the specific character of the birch product, its odor being similar to that conferred on Russian leather by tanning with birch bark."

In regard to the occurrence of formyl and acetyl groups in lignin, W. M. CROSS and B. TOLLENS (*Jour. Landw.*, 59 (1911), No. 2, pp. 185-196; *abstr. in Chem. Ztg.*, 36 (1912), No. 9, *Rept.*, p. 37).—This material has been substantially noted from another source (E. S. R., 25, p. 803).

Plant coloring matters, O. A. OESTERLE (*Schweiz. Wchnschr. Chem. u. Pharm.*, 50 (1912), Nos. 9, pp. 121-130; 10, pp. 137-141).—A review of the chemistry of the vegetable coloring matters.

In regard to chlorophyll, K. KÄTZSCH (*Naturw. Rundschau*, 26 (1911), No. 20, pp. 249-252; 21, pp. 261-264).—This is a review of present knowledge in regard to the chemistry of chlorophyll.

Colloid chemistry of foods and condiments, H. BECHHOLD (*Chem. Ztg.*, 35 (1911), No. 151, pp. 1401-1403).—Numerous examples are cited to support the hypothesis that the foundation of the preparation and judgment of foodstuffs and condiments lies in colloid chemistry.

Yearly reports in regard to the progress made in the examination of foods and condiments, H. BECKURTS, H. FRIEDRICH and H. ELMDE (*Jahresber. Untersuch. Nahr. u. Genussmit.*, 19 (1909), pp. 210; 20 (1910), pp. 166).—These are the reports for the years 1909 and 1910.

Determination of ustillaginous spores in wheat bran, G. GÁBÓH (*Kisérlet. Közlem.*, 14 (1911), No. 4, pp. 569-580, figs. 2).—Two methods are described for determining ustillaginous or smut spores in wheat bran.

In the first method the spores are washed from the bran with water. The starch which is carried over is dissolved and the fluid centrifuged. The protein precipitate, which settles with the spores, is removed by dissolving it with dilute sulphuric acid, and the spores are counted in an aliquot with a counting chamber. On the basis that 1 gm. of a clean sample of spores with a water content of 12 per cent contains 882,000,000 spores, the results can be expressed in percentages by weight.

In the second method 10 gm. of the bran is shaken with some water in a 100 cc. flask, the mixture made up to a bulk of 100 cc. with water, and the whole transferred to a beaker glass. After mixing the fluid thoroughly with a spoon a drop is taken from the surface of the fluid with a glass rod and placed in a counting chamber 0.1 mm. deep and with 16 squares 0.25 mm. on a side. On multiplying the average spore content of one preparation by 0.0133 the spore content of the bran is obtained in percentage by weight.

Inspection of foreign cyanogenetic haricot beans imported into France, GAUTIER and BORDAS (*Ann. Falsif.*, 4 (1911), No. 31, pp. 235, 286; *abstr. in Internat. Inst. Agr.* [Rome], *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 7, p. 1757).—Only beans obtained from Burma are allowed to enter France, and these only when their hydrocyanic acid content does not exceed 20 mg. per 100 gm. An ordinary external examination was not found to be sufficient to detect cyanogenetic varieties, and accordingly the authors recommend a microscopic examination and a chemical analysis for hydrocyanic acid content.

A new method for calculating water in canned tomatoes and the detection of added water to canned tomatoes, L. A. CORGON (*Jour. Indus. and Engin.*

ibid. (1911), No. 19, pp. 744-747).—The acidity of 46 out of 58 samples of canned tomatoes fluctuated between 50 cc. and 70 cc. of decinormal sodium hydroxide for 100 cc. of juice, and with an average of 59.7 cc. The average specific gravity of the juice from these 46 cans, strained through a cheese-cloth of 40 threads to the inch, was 1.0202 at room temperature. The amount of water in the entire 58 samples varied from 90.44 to 96.18 per cent, and of the 46 samples was 93.55 per cent.

On the basis of the above figures the author evolved methods for determining the water in canned tomatoes and the detection of added water. For ascertaining the former the acidity of 100 cc. of juice, expressed in cubic centimeters of decinormal sodium hydroxide solution, is obtained. This figure is divided by 0.1 plus the specific gravity of the juice strained through cheesecloth, and the result (which is termed the ratio) subtracted from the acidity figure. The remainder is then taken from 100. In other words, 100 per cent minus the acidity, minus the ratio, equals the percentage of water.

The excess of water or added water in canned tomatoes is found by subtracting from the percentage of water found 90.44 per cent (the average percentage of water in canned tomatoes of the proper acidity). The highest amount of water added was found to be a little over 5 per cent. The excess water in the tomatoes was due to the addition of brine, used by some factories for conserving the tomatoes previous to canning. The average amount of salt in canned tomatoes was 0.14 per cent.

The above formulas can not be employed for cold packed tomatoes.

Osmotic activity in the egg of the common fowl, A. D. GREENLEE (*Jour. Amer. Chem. Soc.*, 34 (1912), No. 4, pp. 539-545).—As a result of examining White Leghorn eggs at various periods during storage, and at temperatures varying from 32 to 80° F., it was found that the decrease in moisture in the white of the egg was not entirely due to evaporation by the external atmosphere. A certain portion of this moisture seemed to be transferred to the yolk, and this may be explained by the simple process of osmosis.

The yolk, which contains a very high percentage of solids, is surrounded by a membranous tissue called the vitellin membrane, which in turn is surrounded by the egg white, a liquid much more dilute than the yolk. By osmosis the water passes through the membrane from the more dilute to the more concentrated solution until an equilibrium is obtained. In the egg this process continues until the vitellin membrane becomes so weak that it breaks, when the white and yolk begin to lose their identity. This action proceeds with such definiteness that by a process of calculation, knowing the original weight of the egg, the loss in moisture to the external atmosphere can be calculated with surprising closeness to the actual loss as shown by the balance."

As the change in water content increases its rate with the temperature, and diminishes with the time, it is possible by means of a rate formula which is given to predict the condition of the eggs at any temperature and at a given time within a reasonable storage period. Therefore, "the rate multiplied by the time gives the loss in weight, from which data it is a simple matter to find the percentage of moisture remaining."

The value of the guaiac tincture test for differentiating raw from boiled milk. BIRXER (*Deut. Tierärztl. Wchnschr.*, 20 (1912), No. 11, pp. 161, 162; *Molk. Ztg. Berlin*, 23 (1912), No. 13, pp. 146, 147).—Tewes' statements (*E. S. R.*, 27, p. 13) in regard to the reliability of this test are not deemed valid under ordinary conditions. The chief reason for obtaining a positive reaction with some milks is that they have not been properly pasteurized or boiled.

Better cream through grading.—A new butter moisture test, G. H. BENKENBORG (*Wisconsin Sta. Bul.* 220, pp. 14, figs. 2).—In this bulletin the advantages

to be gained by grading cream are pointed out, and the establishment of 2 grades is recommended. The method of determining the acidity of cream by the use of alkaline tablets which is employed at the station is described.

"A new moisture test for butter [is also described, which] requires only 3 minutes for heating the butter, and is as accurate for practical purposes as the test made by the Wisconsin high pressure steam oven. The apparatus is a cast-iron oven $8\frac{1}{2}$ by $3\frac{1}{2}$ by $1\frac{1}{2}$ in., with walls $\frac{1}{2}$ in. thick set on a closed stand high enough to admit an alcohol lamp. The bottom of the sample dish is protected from excessive heat by a sheet of asbestos, while the conductivity of the iron supplies top heat to the sample and prevents foaming and spattering. Practical suggestions for using the test are given.

The determination of moisture in butter, A. C. D. RIVIERE (*Chem. News*, 104 (1911), No. 2714, pp. 261-263, fig. 1).—An accurate method of determining the amount of moisture in butter is described, which depends on the action of water upon calcium carbide (E. S. R., 25, p. 410). Instead of measuring the acetylene evolved during the process the amount was found by determining the difference in weight before and after evolution. The apparatus used for the test is described and illustrated.

On comparing the results with those obtained by the ordinary heating method a difference of from 0.2 to 0.3 per cent was noted with butters having a moisture content of more than 12 per cent. These differences are probably due to the loss of volatile matter other than water brought about by direct heating.

The refraction of the nonvolatile acids of butter, A. VAN RAALTE and F. A. J. LICHTENBELL (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 3, pp. 81-98).—The purpose of this work was to determine the value of estimating the refraction of the nonvolatile acids of butter as an index for detecting adulteration. The authors conclude that in general the refraction of the nonvolatile acids of butter will give very little clue in determining whether a butter is pure or adulterated, very little more, in fact, than is obtained from the refraction of the butter fat itself or the Reichert-Meißl number.

A modified butyrometer for determining the fat content of cheese, H. VAN GULIK (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 3, pp. 99-101, fig. 1).—This is a Gerber butyrometer so modified that it can be employed for determining the amount of fat in cheese.

In regard to the use of reversed filtration and the Weender methods for determining crude fiber, J. SCHRÖDER (*Jour. Landw.*, 55 (1911), No. 2, pp. 105, 106).—A polemic, in which the author points out that he has used the method of reversed filtration in conjunction with the Weender method for determining crude fiber for many years. He states that with the method a chemist can make from 12 to 16 single determinations of crude fiber within 8 hours.

A micro-chemical test for digestible cellulose in feces, J. AMANN (*Schweiz. Wchnschr. Chem. u. Pharm.*, 49 (1911), No. 48, pp. 697-700; *abs. in Chem. Abh.*, 6 (1912), No. 7, p. 875).—According to the author neither the Schmidt and Strasburger nor the Simon and Lohrlich methods, nor the direct microscopic examination of feces, will determine whether or not the residual cellulose present therein is digestible. For this purpose he proposes a micro-chemical reagent which is composed of 10 gm. of anhydrous zinc chloride, 2.5 gm. of potassium iodide, 0.25 gm. of iodine, and 10 gm. of distilled water.

"To apply the test, a small particle of fecal matter, or better, some of the sediment obtained by centrifuging a suspension of comminuted fecal matter in water, is put on a slide, a drop of the reagent cautiously added and the object at once examined under the microscope. Lignified or surface-hardened cell walls and other debris of indigestible cellulose are colored yellow or brown; merely thickened cell walls remain uncolored, but digestible cellulose is stained a char-

from debris of cellulose from bread or boiled potatoes. Simon and Lohrsch state that bread contains 0.2 to 0.4 per cent, potatoes 1.4 to 1.5 per cent of cellulose. Since starch and amylobacteria are turned more or less dark blue by this reagent, the latter detects and characterizes the 4 principles mentioned when they occur together. The observation should be made immediately, because upon prolonged contact with the reagent, thickened cellulose will also exhibit violet coloration."

The canning of foods, A. W. BITTING (*U. S. Dept. Agr., Bur. Chem. Bul. 151, pp. 77*).—This is a description of the methods followed in commercial canning enterprises. The object of the bulletin is to present in a popular form the methods in use in the better types of canning factories, to give teachers of home economics a more accurate idea as to this line of work, and to point out to the consumer what he may reasonably expect when purchasing canned goods, and finally what goes into canned goods. It deals with the early history and theories of preservation by canning; sterilization; modern factory equipment and methods; and detailed consideration of the various products, including fruits, vegetables, marine products, milk, and various specialties and soups.

Peach drying in Chile (*Bul. Mens. Off. Renseign. Agr. [Paris], 10. (1911), No. 6, pp. 107-110; obs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, pp. 1748, 1749*).—"The fruit-drying industry is widespread in Chile, especially in the province of Coquimbo, chiefly in the departments of Elqui and Ovalle, where the hot, dry climate and the high elevation promote rapid evaporation and make natural drying possible. There are two qualities of dried peaches. Those which are peeled and stoned before drying (*descarozados*), and those which are peeled and dried with the stones inside (*buesillos*)."

All varieties grown in Chile have adhering stones. Although the trees as a rule are not properly cared for, the average yield of irrigated, but not pruned, trees is about 220 lbs. of fruit per tree, varying from 110 to 600 lbs. The peaches are gathered before ripening, peeled by hand, sulphured, and exposed to the sun, wind, and dew for 3 days on wicker frames. After this the stones are removed with a short triangular-bladed knife (the smaller peaches are dried with the stone), and again placed on the wicker frames for a period of 3 days. This completes the process. Twenty-two lbs. of fresh peaches yield 4.4 lbs. of peels, 2.2 lbs. of stones, and 4.4 lbs. of dried fruit.

[Converting low-grade vinegar into good vinegar], W. G. SACKETT (*Colorado Sta. Rpt. 1911, p. 21*).—This is a report of progress on a method by which low-grade vinegar (1 per cent acetic acid) can be converted into good vinegar conforming to the legal standard of 4 per cent acetic acid. This is accomplished by introducing a pure culture of yeast along with a culture of acetic acid bacteria, and by adding a 2 per cent cane-sugar solution to the low-grade product. In the experiments a product was obtained within 2 months which showed 5.7 per cent of acetic acid.

Bacteria interfering with the malting process, H. T. GÜSSOW (*Canada Expt. Farms Rpts. 1911, pp. 241-244*).—A description is given of a barley infected with *Bacterium herbicola rubrum* which was obtained from a virgin prairie field. On malting the barley the organism manifested itself by forming a pinkish growth which attacked the radicles and permeated the endosperm. On washing the grain with lime water before malting, no further trouble was experienced.

The oil industry in Algiers, J. FOUSSAT (*Gouv. Gén. Algérie, Dir. Agr., Inform. Agr. Bul. 12, 1912, pp. 132, pls. 7, figs. 44*).—This is a discussion of the economic situation and the technology involved in the olive oil industry. It

also contains a short description of the methods for utilizing the by-products of the olive, the preparation of olive conserves, some chemical methods for examining olive oil, and plans illustrating the various types of oil factories.

The antiseptic effect of creosote oil and other oils used for preserving timber, J. M. WEISS (*Jour. Soc. Chem. Indus.*, 30 (1911), No. 23, pp. 1348-1353).—This work was done with pure cultures of *Bacillus subtilis*, *Saccharomyces glutinis*, and a species of *Penicillium* closely resembling the species described in Bulletin 118 of the Bureau of Animal Industry of this Department (*U. S. R.*, 22, p. 531).

S. glutinis "developed slowly on sterile wood, but after a few months showed its characteristic red color on the surface, and a microscopic examination of a thin section of the surface wood showed evidences of destructive action. The same was noticed with the bacillus, but neither seems to have a high degree of virility. The important feature seems to be that they make sound wood more susceptible to the attacks of higher fungi by a preliminary comparatively slight decomposition. The [*Penicillium*] grows very quickly on wood, and after 2 months the wood shows distinct signs of decay microscopically."

The materials investigated as regards the preservative action for wood were creosote oil with the bases, acids, and solid hydrocarbons removed, various materials added, water-gas tar distillates, pure phenol, cresol, naphthalene, anthracene, quinolin, and paraffin, and commercial creosoting oils. The results obtained are briefly summarized as follows:

"The neutral oils of creosote are strong antiseptics. The middle portion of these neutral oils from 235 to 270° is the strongest, the higher boiling oils are considerably weaker, the lower oils slightly so. High boiling bases of coal tar are strong antiseptics. The coal-tar acids are very strong antiseptics, their efficiency rising with the boiling point. The solid hydrocarbons, naphthalene and anthracene, have low antiseptic value. The addition of filtered tar in moderate amounts to creosote does not materially reduce its antiseptic value. Paraffin has no antiseptic qualities. Water-gas tar distillates have lower antiseptic value, and in this respect are decidedly inferior to the neutral coal-tar oils. Coal-tar creosote is in the highest degree superior as an antiseptic preservative to the water-gas tar distillates and petroleum residues, used for the same purpose."

Maize straw; its use for the manufacture of paper and fodder, B. DONNAN (*English Patent 8638, April 7, 1911; abs. in Jour. Soc. Chem. Indus.*, 30 (1911), No. 23, p. 1376).—"Maize stems are freed from dirt by treatment in a beating and dusting machine; they are then cut up, steeped in water, and shredded into fibers by special tubular refiners. The shredded material is boiled with a dilute solution of acetic acid (0.2 to 0.4 per cent) under a pressure not exceeding 3.5 atmospheres, the digesters being arranged in series so that the liquid from one may be used in the next on the counter-current principle. In this way 17 to 18 per cent of the straw can be extracted. The material is next boiled with lime-water, and, as this becomes neutralized, further small additions of alkaline liquid are made, e. g., milk of lime, a 0.2 per cent solution of sodium carbonate, or 0.1 per cent solution of sodium hydroxid. The end of the operation is indicated when neutralization of the alkali becomes slow. The acid and the alkaline extracts of the stems are evaporated separately to a sirupy consistency, then mixed and absorbed by finely ground maize stems to form a fodder. The extracted material is converted into paper pulp by digestion with sodium hydroxid, the pith cells being separated by treatment on sieves."

The sugar content of maize stalks, G. N. BLACKSHAW (*86. African Jour. Sci.*, 8 (1912), No. 8, pp. 269-275).—This article gives the results of an investigation of the Stewart method, which, briefly stated, consists of removing the

from the corn stalk in the milk stage instead of allowing them to mature their grain. The object of doing this is to increase the saccharose content of the stalk until it practically becomes a sugar cane. Coincident with this, as a secondary result, it is claimed that there is very little deposition of the hard aluminous matter which forms the outer coating of the maize stalk and becomes incorporated with the peripheral fibers when the grain is allowed to ripen, thereby preventing the best of the fibrous matter from being utilized for the manufacture of pulp. In consequence of this, the whole substance of the stalk is resolvable into pulp, and cellulose of the finest quality for paper and for all the higher uses for which cotton cellulose is now employed may be obtained. The author found, however, that "the sugar content of the cobbled and the uncobbled plants examined was practically the same; in other words, that the removal of the cob in the milky stage had no material influence upon the sugar content of the stalk."

See also previous note by Doby (E. S. R., 24, p. 707).

The microscopy of certain paper pulps, T. F. HANAUSEK (*Papier Fabrik*, 9 (1911), No. 48, pp. 1464, 1465, figs. 2; abs. in *Jour. Soc. Chem. Indus.*, 30 (1911), No. 24, p. 1446).—This is a description of the microscopical characteristics of paper pulps made from giant spear grass, which grows in the Terai district of India, and Kaing grass, which has its habitat in the Indian monsoon region.

The microscopy of paper made from cane bagasse, T. F. HANAUSEK (*Papier Fabrik*, 9 (1911), *Sonderausgabe*, pp. 25-38, figs. 5; abs. in *Internat. Sugar Jour.*, 14 (1912), No. 157, pp. 55, 56, fig. 1).—A study of the microscopic characteristics of paper made from cane bagasse. The article is illustrated.

METEOROLOGY—WATER.

Meteorology, W. I. MILHAM (*New York*, 1912, pp. XVI+549, pls. 14, figs. 143, charts 34).—This is essentially a text-book embodying a revision of the junior and senior elective course in meteorology delivered at Williams College during the past 8 years. "The book is also intended for the general reader of scientific tastes." Each chapter begins with a syllabus and ends with a list of references. A bibliography is given in an appendix.

The book "can hardly be called an elementary treatise, but it starts at the beginning and no previous knowledge of meteorology itself is anywhere assumed. It is assumed, however, that the reader is familiar with the great general facts of science." No attempt is made to discuss mathematical meteorology, meteorology applied to living things, meteorology and medicine, and the history of meteorology.

On the estimation of humidity in agricultural meteorology, M. NERUCEV, (*Khozjaistvo*, 7 (1912), No. 4, pp. 89-95; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 862, 863).—Eleven years' observations on the relation of rainfall and yields of spring wheat gave inconclusive results, indicating the impossibility of drawing absolute conclusions from observations on a single factor. An important but often neglected factor is "the evaporating power of the soil and of plants, which is often two or three times as great as the atmospheric precipitation. . . . It is clear, therefore, how this factor must be regarded in calculating the balance of moisture in the soil available for plants. Zebediev has been led by his investigations to the opinion that the aqueous vapors which condense on the ground are of much importance, as they increase the reserve of subsoil water. Consequently, in studying the action of moisture on plant life, it is necessary to examine the conditions which, by accelerating or retarding the processes of condensation, determine the cir-

culation of aqueous vapor from the soil to the surrounding atmosphere, and again from the latter to the soil."

Bulletin of the Mount Weather Observatory (U. S. Dept. Agr., Bul. Mount Weather Observ., 4 (1912), pls. 4, pp. 183-304, figs. 33; 5, pp. 305-395, figs. 24; 6, pp. 397-456, figs. 15).—These numbers contain the following articles:

Part 4.—Free Air Data: Sounding Balloon Ascensions at Indianapolis, Omaha, and Huron, by W. R. Blair.

Part 5.—Vertical Temperature Gradients in Hawaii, by A. J. Henry; Diurnal Variation of Pressure at Point Reyes Light, by J. Jones; The Temperature at Mount Weather and Adjacent Valley Stations (illus.), by A. J. Henry; and Free Air Data at Mount Weather for July, August, and September, 1911 (illus.), by W. R. Blair.

Part 6.—Dust Layers in the Atmosphere and Changes in the Neutral Points of Sky Polarization, by W. J. Humphreys; The Upper Atmosphere (illus.), by W. J. Humphreys; Echelon Clouds (illus.), by W. J. Humphreys; Review of Busch and Jensen "On the Facts and Theories of Atmospheric Polarization," by H. H. Kimball; and Free Air Data at Mount Weather for October, November, and December, 1911 (illus.), by W. R. Blair.

Monthly Weather Review (Mo. Weather Rev., 40 (1912), Nos. 1, pp. 1-162, pls. 10, figs. 3; 2, pp. 163-320, pls. 10, figs. 2).—In addition to the usual climatological summaries, weather forecasts and warnings for January and February, 1912, notes on the application of upper-air observations to weather forecasting, January and February, 1912, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, condensed climatological summaries, and climatological tables and charts, these numbers contain the following special papers:

No. 1.—Hydroelectric Development at Tallulah Falls, Ga., by C. F. von Herrmann; Climatic Charts of Savannah, Ga. (illus.), by J. deB. Kops; Winter Damage to Peaches, by J. W. Smith; The Climate of the City and Country Compared, by J. W. Smith; Notes on the Rivers of the Sacramento and San Joaquin Watersheds for January, 1912, by N. R. Taylor; A Study of Dry Seasons in San Diego, by F. A. Carpenter; Studies in Frost Protection—Effect of Mixing the Air (illus.), by A. G. McAuley; and Report on the January, 1912, Freshet in the Willamette River, by E. A. Beals.

No. 2.—Storm of February 22, 1912, at New York City, by C. D. Reed; The Average Stream Flow of the Coosa and Alabama Rivers, by C. F. von Herrmann; Smudging Against Frost; Storm of February 20, 1912, at Austin, Tex., by A. Deussen; The Cooperative Weather Bureau Observers of Utah, by J. C. Alter; Notes on the Rivers of the Sacramento and San Joaquin Watersheds during February, 1912, by N. R. Taylor; Weather at Fresno, Cal., during February, 1912, by W. E. Bonnett; Note on the Weather at Point Reyes Light, Cal., during February, 1912, by J. Jones; Effect of Abnormal Weather Conditions during the Construction of the Los Angeles Aqueduct, Abstracted from Report of the Engineers, by A. G. McAuley; and Covering Almond Trees for Frost Protection (illus.), by A. G. McAuley (see p. 345).

The weather of the past agricultural year, F. J. BRADIE (Jour. Roy. Agr. Soc. England, 72 (1911), pp. 418-424).—The weather conditions for the British Isles during 1911 are summarized in the usual form and compared with the averages for previous years. The main characteristics of the weather of the year were a deficiency of rainfall and excess of temperature and sunshine.

The weather of Scotland in 1911, A. WATT (Trans. Highland and Agr. Soc. Scotland, 5, ser., 24 (1912), pp. 337-343).—This report, like those of previous years, "consists of (1) a general description of the weather over the Scottish Isles from month to month; (2) a selection of rainfall returns, in which each

county in Scotland is represented by one more station. . . . The outstanding features of the year were the high level at which the barometer stood for long periods during the first 10 months, the large amount of mild or warm weather experienced, and the remarkable rainfall shortage in some eastern districts."

The chemistry of rare rain (*Lancet* [London], 1912, I, No. 19, p. 1291).—Examinations of rain which fell in London after a 5 weeks' drought, the sample being taken about 1 hour after the rain began to fall, showed 0.525 gr. of ammonia per gallon of water. This is about seven times more than is found in rain collected under normal conditions.

The fertilizing value of rain and snow, F. T. SHUTT (*Canada Expt. Farms Rpts.* 1911, pp. 200, 201).—This is a report on the fourth year's work on this subject (*E. S. R.*, 24, p. 417), covering the year ended February 28, 1911. The precipitation during this year was 26.97 in., about 10 in. below the average for the locality. The total nitrogen per acre brought down by rain and snow was 5.27 lbs.; about 84 per cent being furnished by the rain and 16 per cent by snow. Of the total nitrogen, 3.73 lbs. was in the form of free and albuminoid ammonia and 1.54 lbs. as nitrates and nitrites.

Observations on the ground water level, F. VOGEL (*Mitt. Deut. Landw. Gesell.*, 27 (1912), No. 23, pp. 328-330, figs. 4).—The importance from the standpoint of water supply, drainage, etc., of systematic observations on the level of the ground water by means of tubes put down in the soil, and methods of making and interpreting such observations, are briefly discussed.

Report of progress of stream measurements for the calendar year 1910, P. M. SAUNDERS (*Dept. Int. Canada, Sess. Paper No. 25d*, 1912, pp. 244, pls. 16).—Descriptions of the stream and creek basins are given, the methods of procedure outlined, and a large amount of tabulated data and stream measurements are given.

The water supply of farm homesteads, F. T. SHUTT (*Canada Expt. Farms Rpts.* 1911, pp. 201-206).—Analyses of 130 samples of water are reported, of which 48 were considered wholesome, 36 suspicious, 33 seriously contaminated, and 18 saline.

Sterilization of drinking water by ultraviolet light, J. COURMONT (*Chem. Ztg.*, 35 (1911), No. 87, p. 806; *abs. in Jour. Soc. Chem. Indus.*, 30 (1911), No. 16, p. 1027; *Chem. Abs.*, 6 (1912), No. 9, pp. 1190, 1191).—"The author discusses the remarkable sterilizing power of the ultraviolet light from a quartz mercury vapor lamp. For sterilizing water, which is comparatively transparent to the radiation, it is sufficient to place the lamp in the axis of a cylindrical vessel 60 cm. in diameter. Liquids containing colloids (wine, beer, peptone solution, etc.) absorb the ultraviolet rays rapidly, and therefore sterilization is limited to the surface layer. It is therefore necessary that for greatest efficiency the water to be sterilized must be as clear as possible. The action of sterilization is in no way connected with ozone or hydrogen peroxid formation."

Purification of water by Infusoria, C. S. STOKVIS and N. H. SWELLENGREBEL (*Jour. Hyg. [Cambridge]*, 11 (1911), No. 4, pp. 481-486; *abs. in Chem. Abs.*, 6 (1912), No. 9, p. 1181).—The investigations here briefly reported are summarized as follows:

"Infusoria have the same bactericidal power as flagellates. Emulsions containing *Bacillus typhosus*, *Vibrio cholera*, *V. El Tor*, *B. megatherium*, and *Spirillum volutans*, to which *Colpoda cucullus* is added, are soon cleared. Before the clearance the Colpoda multiply actively.

"This bactericidal effect does not depend upon the production of toxic substances by the Infusoria. The fluid obtained from filtered cultures of the

Infusoria exerts no bactericidal effect. Only living Infusoria are able to clear the emulsions.

"Direct sunlight does not prevent the clearing of the emulsions by the Infusoria, but temperatures below 10° C. and above 30° C. and absence of oxygen (anaerobic culture) are unfavorable to their exerting a bactericidal effect.

"The polluted water of the canals of Amsterdam slightly delayed the clearing of the emulsions; the sewage of starch factories and gas factories completely prevented this clearance.

"Consequently under natural conditions Infusoria will only play a part in purifying river water (1) if the temperature is above 10° and under 30° C., (2) if the aquatic vegetation is rich enough to supply the necessary quantity of oxygen, (3) if the water is not highly polluted by adjoining factories."

Sewage pollution of interstate and international waters with special reference to the spread of typhoid fever, A. J. McLAUGHLIN (*Pub. Health and Hosp. Serv. U. S., Hyg. Lab. Bul. 33, 1912, pp. 296, charts 31, maps 39*).—This report deals with Lake Superior and St. Marys River; Lake Michigan and the Straits of Mackinac; Lake Huron, St. Lawrence River, Lake St. Clair, and the Detroit River; and Lake Ontario and St. Lawrence River. See also a previous report (*E. S. R.*, 25, p. 720).

It is shown that "there is an undue prevalence of typhoid fever in many cities and towns in the drainage basin of the Great Lakes. This excessive prevalence of typhoid fever, especially in the winter and spring months, is due in greatest measure to sewage pollution of interstate and international waters used as a source of public water supplies. Given the sewage pollution of the source of supply, the excessive prevalence is made possible by the use of such water unfiltered and untreated or by the faulty operation or poor efficiency of filter plants. Most of the cities with excessive prevalence of typhoid fever use unfiltered surface water as a public supply, although disasters have occurred where inefficient filtration was being depended upon to make a polluted water safe."

The suggested remedy for the conditions described is, therefore, the substitution of carefully filtered or treated supplies "for the present polluted or dangerous public supplies where adequate protection of such supplies against pollution is not feasible." Specific advice is given on this point.

The Berlin sewage farms (43,009 acres), H. A. ROECHLING (*Jour. Roy. Sanit. Inst.*, 33 (1912), No. 5, pp. 178-206).—This is a more detailed account of the work of these farms during the year ended March 31, 1910, than that previously noted (*E. S. R.*, 26, p. 317). An important practical fact emphasized in the article is that in addition to efficiently purifying the sewage the farms paid a net profit of \$2.66 per million gallons of sewage handled.

Irrigation with sewage (*Engin. Rec.*, 65 (1912), No. 3, pp. 82, 83).—A plea is made for better utilization of the fertilizing matter of sewage, and the general proposition is advanced that better results from an economic standpoint could be obtained by quick handling of fresh sewage in a large number of small plants rather than by one large plant involving more or less decomposition and loss of fertilizing matter in the sewage. In an editorial, commenting on this proposal, the practical difficulties in the way of utilization of sewage for fertilizing purposes are concisely stated.

The struggle with sewage sludge, W. NAYLOR (*Surveyor*, 41 (1912), No. 1064, pp. 818-821, fig. 1).—The article reports a number of analyses of sludge and discusses its value as fertilizer, more particularly certain recently proposed methods for preparing the sludge in improved form for this purpose.

The most important improvement brought about by these methods is the reducing of the sludge to a light friable material free from excessive water.

and grease, especially the latter. Analyses by the author of several samples of mucks show grease varying from 2.2 to 20.7 per cent on the basis of dry matter, also phosphoric acid from 1 to 6.3 per cent, and nitrogen from 0.8 to 3.8 per cent. Various processes of removing the grease are described, preference being accorded to the so-called Ekenburg wet carbonizing process originally designed for wet distillation of peat.

SOILS—FERTILIZERS.

Soils of the eastern United States and their use, XXXVI-XXXVII, J. A. BONSTEEL. (*U. S. Dept. Agr., Bur. Soils Circs. 63, pp. 16; 64, pp. 12*).—These circulars discuss 2 soil types with respect to geographical distribution, characteristics, surface features and drainage, use, improvement, and crop adaptations.

Circular 63 discusses the Volusia silt loam, of which a total of 821,134 acres have been surveyed and mapped by the Bureau of Soils. It "is an extensive type of soil developed at the higher altitudes in the glaciated northern portion of the plateau country which extends westward along the New York and Pennsylvania line from the vicinity of the Delaware River to the northeastern part of Ohio." The surface drainage is fairly well established, but "the internal drainage of the subsoil is poor over considerable areas, and numerous springs give rise to small swampy areas even upon some of the steeper slopes. The drainage is one of the chief requisites to the better farming of large areas of this soil." Oats, buckwheat, potatoes, and grass for pasture and hay are the principal crops. Corn is grown successfully only at the lower elevations except for silage, in which case it may be grown at higher altitudes, the flint varieties being best adapted.

Circular 64 discusses the Hagerstown clay, of which a total of 371,290 acres in 12 different areas in 7 States have been surveyed and mapped. This type "is an extensive limestone valley soil occurring throughout the valleys of the Appalachian Mountain region and of the blue-grass region of Kentucky. The soil is particularly well suited to the production of wheat and grass, and upon properly tilled areas corn is also an important and profitable crop. The topography of the type is usually rolling and sloping and the natural surface drainage is good."

The soils of Prince George's County, J. A. BONSTEEL. (*In The Physical Features of Prince George's County. Baltimore: Md. Geol. Survey, 1911, pp. 151-184*).—This report was prepared under the supervision of the Bureau of Soils of this Department, and describes the agricultural conditions, geological relationships, and physical and chemical characteristics of the leading soil types of the county.

The entire area, excepting a small part covered by the Cecil mica loam, lies within the Coastal Plain region of the State. The most important soil types are the Leonardtown loam, Susquehanna gravel, Windsor sand, Westphalia sand, meadow, Norfolk sand, Collington sandy loam, Susquehanna clay, and the Susquehanna clay loam, all "derived from the unconsolidated sediments belonging to the mesozoic and cenozoic portions of the geological column."

"The great variety of soils found in the county, the moderate climate and general healthfulness of the greater part of the county, its accessibility by rail and by water, all favor a greater specialization of agriculture and increased profits from the cultivation of the soil."

Has the fertility of land in India decreased? B. COVENTRY (*Agr. Jour. India, 7 (1912), No. 1, pp. 45-54*).—This article gives in synopsis form the replies of the agricultural directors of the various provinces of India to the question as to the relative fertility of agricultural land at present as compared with former

times. It is concluded that although there is no statistical evidence to show what change has taken place the reports would indicate that the fertility of Indian soils has been more or less in a stationary condition with a tendency to improve under better treatment. The low rate of production in India as compared with western nations is attributed mainly to the small amount of capital employed.

Modern soil investigations, K. O. BJÖRLYKKE (*Tidsskr. Norske Landbr.* 1912, No. 2, Sup., pp. 60).—A lecture delivered in January, 1912, being a general discussion of soil problems, the methods of soil investigations adopted in Germany, Hungary, Bohemia, France, England, and the United States, and the history of soil studies in Norway. A chapter on simple practical methods of investigation of soils is included at the close of the pamphlet.

On the degree of consistency and stiffness in soils, A. ATTERBERG (*Landtbr. Akad. Handl. och Tidsskr.*, 51 (1912), No. 2, pp. 93-123, figs. 21).—The author's method of classifying soils according to their physical characteristics as regards plasticity and firmness is given. Two forms of apparatus for the determination of firmness and plasticity figures are described and the results obtained are discussed for purposes of soil classification. See also a previous note (*E. S. R.*, 26, p. 220).

Corrections in physical science, D. L. NARAYANA RAO (*Hyderabad, Deccan, India*, 1912, pt. 1, pp. 17; pt. 2, *The Rationale of Agriculture*, pp. 31).—These pamphlets deal particularly with physical factors controlling soil moisture and the relation of tillage operations thereto. Attention is called to the fact that soils have in many cases been shown to lose much more water by evaporation and transpiration from plants than is supplied by precipitation, an apparent yearly deficit of about 25 in. from the earth's surface being generally admitted. The author maintains that the deficit is supplied and proper moisture conditions maintained in the soil not by capillary rise from below, for "there is no such thing as capillarity" as the term is generally understood, but by absorption of aqueous vapor from the air which penetrates and permeates the soil in a so-called process of "breathing."

"For the vapor to be properly caught or for allowing every individual soil grain to breathe well, the grains or particles must present to the air as much of their surfaces as possible at the same time touching each other gently on all sides. It is only then that perfect breathing of soils takes place. Where such breathing is going on in nature the soils are highly fertile and centuries of constant cultivation are unable to exhaust their fertility. I can quote as instances almost all the new formations by geological actions. They are most fertile. Nature is always digging and plowing and draining and making new soils. The breathing of the earth is the greatest geological force in nature."

The moisture content of packed and unpacked soils, F. T. SHURT (*Canada Expt. Farms Rpts.* 1911, p. 172).—Further observations (*E. S. R.*, 24, p. 421) on the effect of subsurface packing in conserving soil moisture showed no very great advantage from this practice, although it appeared that the packed land started the season with slightly more moisture than that which had not been so treated.

Soil tank investigations, A. W. BLAIR (*Florida Sta. Rpt.* 1911, pp. XXXII-XXXIX, figs. 4).—Experiments on the effect of different combinations of fertilizers on the growth and health of orange trees growing in tanks at the station (*E. S. R.*, 25, p. 427) are reported, with measurements of rainfall, determinations of moisture in the tank soils, and analyses of the drainage from the tanks and of soils from a number of orange groves.

The experiments have not proceeded far enough to give conclusive results. It appears to be clearly indicated, however, that the soils of orange groves are

likely to lose nitrogen rapidly and hence to be deficient in this constituent. The tank soils lost nitrogen, mostly nitrates, in the drainage at the rate of 910½ lbs. of sodium nitrate per acre from July 7 to May 23. The surface soil of the orange groves examined contained only about one-half as much nitrogen as that of virgin hammocks. The loss of phosphoric acid and potash in the drainage of the tanks was much smaller than that of nitrogen, and there was less difference in this respect between virgin and the orange-grove soils.

A study of alkali soils, E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul.* 2 (1912), No. 4, pp. 55-58).—The results of determinations of alkali salts in soils upon which the oat crop showed marked difference in productiveness are reported, and correlated with crop yields in pot experiments with oats, timothy, and alfalfa with and without additions of gypsum and blood to the soil.

From the results of the analyses it is estimated that the poor soils contained 73,580 lbs. of water-soluble alkali salts per acre to a depth of 2½ ft. as compared with 18,600 lbs. in the good soils. The sodium carbonate content, however, was lower in the poor soils. Applications of gypsum gave slightly increased yields with oats and timothy. Blood also acted very favorably with these crops. In view of the fact that the soils were already well supplied with nitrogen it is believed that the beneficial effect of the blood may have been due to the incorporation with the soil of nitrifying organisms. Alfalfa was not benefited by the addition of either gypsum or blood.

Plant food lost in drainage from uncultivated peat soils and from such soils growing different crops, H. VON FELITZEN ET AL. (*Svenska Mosskulturför. Åsår.*, 26 (1912), No. 2, pp. 111-154, figs. 4).—The results of 5 years' lysimeter trials at the Jönköping Experiment Station are reported.

Eight cement boxes (15 by 80 cm., 50 cm. deep) were placed in the ground and connected with bottles for collection of drainage waters. Each lysimeter was filled with about 64.5 kg. (about 207.9 lbs.) of a good quality of peat soil, containing about 60 per cent organic matter, 0.78 per cent lime, 0.66 per cent potash, 0.13 per cent phosphoric acid soluble in 12 per cent cold hydrochloric acid, and 2.15 per cent nitrogen. Two of the lysimeters were left unfertilized, while applications of superphosphate, superphosphate and 37 per cent potash salts, or the latter fertilization with nitrate of soda, were made to two lysimeters each. The amounts of fertilizers applied each year are given and the crops grown during the years 1906 to 1909, viz, oats, potatoes, and ruta-bagas. During the first year the soil lay fallow in all lysimeters. Complete data are presented as to amounts of precipitation, drainage water, and plant food (lime, potash, phosphoric acid, and nitrogen) removed in the drainage water and in the crops during each year. Analyses of the soil in all lysimeters in three different depths were made at the conclusion of the trials. The results obtained are discussed in some detail.

During the first year (fallow) considerable lime, nearly as much potash, and considerable nitric nitrogen were washed out, while the loss of phosphoric acid was insignificant. The losses were most marked in the case of the fertilized soil. During the 4 years when crops were grown on the soil the losses of lime were likewise largest, with potash and nitrogen following in the order given; the losses of phosphoric acid were small and of no practical importance. Much larger losses were sustained for lime and nitrogen on the unfertilized than on the fertilized soil, owing to the smaller crops grown thereon, while the losses for potash were about the same in all cases. The losses on the grass plots were considerably smaller than for the other crops. The soil analyses showed that in spite of the fertilizer applied the contents of lime, potash, and nitrogen were diminished during the 5 years' experimental period, while that

of phosphoric acid increased. The decrease was, however, small in proportion to the total amounts of the ingredients in the soil.

Regarding humus acids of Sphagnum turf, S. OHR (Ber. Deutsch. Chem. Gesell., 45 (1912), No. 4, pp. 651-660; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 7, p. 350; Chem. Abs., 6 (1912), No. 16, pp. 2275, 2276).—The author first reviews briefly different conceptions regarding the nature of humus acids, particularly as regards the question whether the reaction between alkali and humus acid results in a peptonization of the colloidal material or in a chemical precipitation of noncolloidal alkali compounds. He then describes a method of preparing solutions of ammonium humate free from colloids and from it, by precipitation with hydrochloric acid, humic acid in suspension free from salts, and reports studies of the reaction changes between humic acid suspensions and alkali solutions as determined by conductivity measurements.

The results of such measurements show that the interactions between ammonium solutions and humus acid really resulted in salt formation. The neutralization of sodium hydroxid with humic acid gave an equivalent of the acid of about 330. It appeared that humic acid is probably tribasic with a molecular weight of about 1,000. Purified humic acid when dried at 100° C. was converted into a hard mass which formed a black, lustrous powder. This powder did not go into suspension in water and was not soluble in alkali solutions immediately, but when treatment (with sodium hydroxid) was prolonged it gradually passed into solution yielding a brown liquid.

The influence of carbon upon nitrification, H. W. CLARK and G. O. ADAMS (Jour. Indus. and Engin. Chem., 4 (1912), No. 4, pp. 272-274).—Experiments are reported which showed that the addition of easily assimilable carbohydrates like sugar and molasses to sewage filter beds checked nitrification but at the same time tended to clear the beds of organic matter.

The present status of soil inoculation, K. E. KELLERMAN (Centbl. Bakt. [etc.], 2. Abt., 34 (1912), No. 1-3, pp. 42-50, pls. 2).—This is the full text of a paper of which an abstract has already been noted (E. S. R., 23, p. 520). An annotated bibliography of American studies on the subject is appended to the article.

Azotogen, nitragin, and natural inoculating soil, A. KÜHN (Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 21-24, 548-552).—The author takes exception to the conclusions of von Fellitzen (E. S. R., 25, p. 123) regarding the relative efficiency of azotogen and nitragin.

Azotogen, nitragin, or inoculating soil, E. TEISLER (Centbl. Bakt. [etc.], 2. Abt., 34 (1912), No. 1-3, pp. 50-56).—The relative merits of these materials for inoculating purposes are discussed on the basis of the work of von Fellitzen (E. S. R., 25, p. 123), A. Kühn (see above), and others.

Inoculation experiments with nitragin for legumes, F. T. SHURT (Canada Expt. Farms Rpts. 1911, pp. 174-176).—As in previous years, there was no material benefit from the use of this material.

Nitrogen enrichment of soils through the growth of clover, F. T. SHURT (Canada Expt. Farms Rpts. 1911, p. 173).—Further observations on this subject (E. S. R., 22, p. 321) showed that the soil continues to increase in nitrogen under this treatment.

The increasing of the ammonia fixing power of soils under the influence of calcium carbonate, O. LEMMERMAN and L. FRESERIUS (Pflüger's Landw. Ztg., 61 (1912), Nos. 7, pp. 240-253, No. 1; 8, pp. 274-285).—It was found in these experiments that the addition of calcium carbonate to soil in pots to the extent of 1 per cent reduced the volatilization of ammonium carbonate and increased the absorptive power of the soil for ammonia. Canadian lime had the

opposite effect. Calcium sulphate and chlorid reduced loss solely by their direct action on the ammonium carbonate.

The chlorid was the only salt of magnesium which reduced loss of ammonia. Potassium and sodium chlorids, sulphates, and carbonates, as well as kainit and Thomas slag, reduced the absorptive power of the soil. Treatment with alcohol was without effect. On the other hand steaming, and especially igniting, had a marked effect.

The effect on absorption was dependent not only upon the bases but upon the nature of the acids with which they were combined. The absorptive power of the soil appears to be dependent mainly upon the exchange of bases in the soil compounds. The more rapid the aeration the greater was the loss of ammonia. The character of the soil exerts a great influence not only on the absorption of ammonia but on the action of lime on the absorption, rendering the addition of lime favorable, unfavorable, or without effect. See also previous notes (E. S. R., 21, p. 417; 28, p. 320).

The active potash of the soil and its relation to pot experiments, G. S. HARRIS (*Texas Sta. Bul.* 145, pp. 39, figs. 3).—The results of studies of the active potash in soils as measured by the solubility in fifth-normal nitric acid are reported, and the analytical data compared with crop yields in pot experiments with different crops on a large number of Texas soils. During the course of the work a study was made of the solubility of potash of a number of minerals which may be present in the soil. The method of conducting the pot experiments was substantially the same as that employed in studies of the active phosphoric acid (E. S. R., 23, p. 423). The author summarizes his results as follows:

"The potash of nephelite, leucite, glauconite, biotite is completely extracted by strong hydrochloric acid. About one-third of the potash of muscovite is extracted and only a small percentage of the potash of microcline and orthoclase. Practically no potash is removed from orthoclase and microcline by fifth-normal nitric acid, less than 10 per cent from glauconite and biotite, and from 15 to 60 per cent from muscovite, nephelite, leucite, apophyllite, and phillipsite.

"Potash dissolved by fifth-normal nitric acid from soils represents a portion of the potash in the easily decomposed minerals. From 36 to 100 per cent of the potash absorbed from aqueous solution by certain minerals was extracted by fifth-normal nitric acid. Two per cent ammonia dissolved from 9 to 45 per cent of the potash absorbed by minerals.

"The potash extracted represents the difference between the potash dissolved and that fixed from the solution. The fixation of potash from fifth-normal nitric acid is much less than the fixation of phosphoric acid from the same solvent. The potash extracted from the soil by successive treatments with fifth-normal nitric acid at first represents easily soluble potash, and is finally reduced to the small amount of potash dissolved from highly insoluble minerals. Increasing the quantity of potash mineral to a fixed amount of solvent increases the quantity of potash extracted, but the percentage of the potash extracted decreases.

"The quantity of potash extracted by fifth-normal nitric acid below 50 parts per million represents 1 to 2 per cent of the potash of highly insoluble silicates. The quantity extracted in excess of approximately 50 parts per million represents a comparatively large percentage of a much smaller quantity of more easily soluble potash.

"The potash extracted by fifth-normal nitric acid from the soil is not necessarily in the same form of combination in different soils and does not necessarily have the same value to plants. . . .

"The percentage of crops which show an increase in growth caused by the addition of potassium fertilizers, decreases from 86.7 with soils containing less than 50 parts per million of active potash to zero in soils containing 800 to 1,000 parts per million of active potash. The effect of the potash decreases with the active potash in the soil.

"The percentage of crops injured by the potash increases with the quantity of active potash in the soil.

"The effect of the addition of potash to the soil upon the average weight of the crop in the pot experiments decreases with the quantity of the active potash in the soil. When the soil contains more than 200 parts per million of active potash, addition of potash does not increase the average weight of the crop, but, often decreases the crop.

"The average percentage of potash contained in 235 crops increased with the percentage of active potash in the soil. The average quantity of potash removed from the soil by the crops increases with the quantity of active potash in the soil. Relatively enormous quantities of potash are removed by the crops in these pot experiments. Expressed in terms of bushels of corn equivalent to the potash removed, the quantity averaged 58.6 bu. in soils containing less than 50 parts per million of active potash and 413.8 bu. in soils containing 600 to 800 parts per million.

"Deficiency of plant food is a relative term and depends upon the growth which can be made under the conditions of the experiment. Soils containing less than 50 parts per million of active potash were deficient in 87 per cent of the pot tests and the average crop without potash is 67 per cent of that with potash, and yet these soils gave up enough potash to the crop to produce 58 bu. corn to the acre, on the average.

"There is a loss of active potash consequent upon the cropping of the soil. The loss is approximately one-half of the potash taken up by the plant when the active potash exceeds 100 parts per million. When the active potash is between 50 to 100 parts per million, the loss is about one-fifth of the potash taken up by the plant. When the active potash is about 50 parts per million or less, there may be no observed loss."

The feeding of plants with mineral matter through the leaves, L. HILTMER (*Prakt. Bl. Pflanzenbau u. Schutz*, n. ser., 10 (1912), No. 1, pp. 6, 7, fig. 1; *Deut. Obstbau Ztg.*, 1912, No. 7, pp. 143, 144, fig. 1).—A brief account is given of the growing of rape plants in sterile sand practically free from potash, certain of the plants receiving no application of potash while in other cases a 2 per cent solution of potassium sulphate was painted upon the leaves from time to time but no potash was applied to the soil. The plants grown in sterile sand without potash made practically no growth while those on which the potash solution was applied to the leaves grew and matured normally.

Results of cooperative fertilizer tests on clay and loam soils, J. B. ABBOTT and S. D. CONNER (*Indiana Sta. Bul.* 155, pp. 99-132, figs. 7).—During the past 8 years about 225 cooperative fertilizer tests on clay and loam soils have been undertaken by the station, mainly with corn and wheat, but also including oats, potatoes, cannery tomatoes, and one or more experiments with each of 15 other crops of less general importance. Such of the results of the corn, wheat, oats, potato, and tomato experiments as are deemed of value, one timothy experiment, and a few miscellaneous experiments, are included in this bulletin.

The results of these experiments are summarized as follows:

"In the corn fertilization experiments, complete fertilizer gave the largest average increase, but phosphoric acid and potash gave the largest average profit. In the amounts used on corn, nitrogen caused a small average increase and was used at a loss, potash caused a larger average increase and was used

at a profit, and phosphoric acid caused the largest average increase and was used at the greatest average profit per acre.

"In the wheat fertilization experiments the complete fertilizer gave the largest average increase, and the greatest average profit per acre. In the amounts used on wheat, each element was profitable, and they stood in the same order of importance as in the corn fertilization experiments. The use of 200 lbs. of fertilizer per acre on wheat proved more profitable than the use of 100 lbs. per acre.

"Phosphoric acid and potash gave a greater profit, per dollar invested in fertilizer, than complete fertilizer, on both corn and wheat. Fertilizer gave a greater average profit per acre on wheat than on corn, and was profitable in a much larger percentage of the experiments.

"Fertilization increased the yield of oats about the same number of bushels per acre as in the case of wheat.

"In the potato fertilization experiments, complete fertilizer gave the greatest average increase, but the amount used was apparently too large to give the greatest immediate profit. The formula used for potato fertilization, 4:8:10, was found to be relatively too low in phosphoric acid content in proportion to nitrogen and potash. In the amounts used for potato fertilization, nitrate of soda was not as effective as dried blood. Muriate and sulphate of potash were equally effective in increasing the yield, but in some cases sulphate produced potatoes of better quality.

"In the tomato fertilization experiments, complete fertilizer gave the largest average increase and the largest average profit. It was more profitable to use 500 lbs. of fertilizer per acre on tomatoes than to use 250 lbs. per acre. Nitrogen derived partly from nitrate of soda and partly from dried blood gave better results on tomatoes than nitrogen derived wholly from dried blood, or wholly from nitrate of soda. Fertilization of tomatoes in the hill gave better results than broadcast fertilization.

"The use of complete fertilizer gave better results on timothy than the use of nitrate of soda alone, particularly the second year.

"Nitrogen derived from peat was not as effective as nitrogen derived from dried blood in any case. The purchase of nitrogen in large amounts for corn and wheat fertilization did not prove profitable.

"Heavy applications of fertilizer showed a lasting effect comparable to that of manure. Rock phosphate did not give appreciable results until the second year after application.

"In nearly all experiments with all crops on clay and loam soils phosphoric acid was found to be the most effective of the fertilizer elements."

The fixation of atmospheric nitrogen by the use of aluminum nitrid, F. MARKE (*Génie Civil*, 61 (1912), No. 2, pp. 30-33; *Engrais*, 27 (1912), No. 21, pp. 77-581; *abs. in Chem. Abs.*, 6 (1912), No. 15, p. 2130).—The history, theory, and the practical operation of this method of fixation of free nitrogen are discussed. The process is of special agricultural importance because of the high nitrogen content (33 to 35 per cent) and cheapness of production of the nitrid. Its direct action as a fertilizer has, however, not been fully investigated.

On phosphoric acid fertilization and its importance in moor culture, H. von FELLTZEN (*Svenska Mosskulturför. Tidskr.*, 26 (1912), No. 2, *Sup.*, pp. 64, *Ups.* 30).—A treatise on the subject, based largely on the results of recent investigations and practical experiences in the cultivation of moor soils. The results show the predominant need of phosphatic fertilizers on these soils.

The fertilizing value of superphosphate, F. KLINGERFUES (*Zentral. Kunst- u. Industrie*, 16 (1911), p. 376; *abs. in Chem. Ztg.*, 36 (1912), No. 4, *Reperi.*, p. 18).—The changes which phosphate undergoes in the process of treatment

with acid and during the "ripening" (and reversion) of the superphosphate on standing are discussed in relation to the availability of the phosphoric acid to plants. It is claimed that the "ripened" superphosphate is readily available and is less subject to leaching in the soil.

The use of phosphatic fertilizers in France, HITIER (*Bul. Soc. Encour. Indus. Nat.* [Paris], 115 (1911), No. 6, pp. 343-355; *abs. in Nature* [London], 83 (1912), No. 2204, p. 429).—The amount and character of phosphates used in France, as well as the factors affecting the price of phosphatic fertilizers during recent years, are discussed in this article.

It is shown that large amounts of basic slag and superphosphate, but little rock phosphate, are used in France. "More than a quarter of a million tons of basic slag are used annually on the grass land, especially where the soil is derived from granite and schists, while about one and a half million tons of superphosphate are used annually on the arable land, and a good deal of phosphate is also contained in the guano applied as fertilizer."

It is stated that the price of superphosphates has usually been lower in France than in England, but now that the French deposits of rock phosphate are giving out it is necessary to look elsewhere for supplies of this material, and the price is therefore increasing. At the same time the price of pyrites, from which the sulphuric acid used in the manufacture of superphosphates is made, has also increased.

Discussing the effect of phosphates on the quality as well as the quantity of farm products, it is pointed out that Müntz has shown that dairy products, particularly butter of the finest quality, are obtained only from pastures exceptionally rich in phosphates, and that Paturel has shown a clear connection between the quality of wine and the supply of phosphates.

The production of phosphate rock in 1911, F. B. VAN HORN (*Amer. Fert.*, 36 (1912), No. 11, pp. 21-28).—In 1911 the total marketed production was 3,053,279 long tons, valued at \$11,900,693, as compared with 2,654,988 long tons, valued at \$10,917,000, in 1910. "This increase was almost entirely in Florida land pebble, though Tennessee also showed a good gain. The average price of all rock showed a falling off, being \$3.90 in 1911, as compared with \$4.11 in 1910."

The business aspect of the kelp proposition, F. P. DEWEY (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 4, p. 311).—This article emphasizes especially the difficulty and cost of gathering and drying the kelp in the preparation of potash salts from this source. Assuming the possibility of in time reducing the cost of gathering to 25 cts. per ton and of air-drying to 15 cts. per ton, and that the iodine will pay the cost of all operations on the air-dried kelp, it is estimated that a ton of potassium chlorid from kelp will cost, laid down on the Atlantic coast, \$28.

Potash lime, its preparation and use in agriculture, MÖLLER ET AL. (*Deut. Zuckerindus.*, 37 (1912), No. 22, pp. 481-483).—Experiments on beets and oats with this material, which is prepared by treating lime with the waste solution from the manufacture of potash, and which contains according to the analysis reported about 48 per cent of lime and 1.4 per cent of potash, are briefly reviewed, indicating a decided fertilizing value. See also a previous note (E. S. R., 26, p. 526).

Carriers of lime, J. W. AMES (*Ohio Sta. Circ.* 123, pp. 135-142).—"A general description of the several forms and of the by-product materials containing lime is presented in this circular."

Sulphur as a fertilizer, A. HERAUD (*Petite Rev. Agr. et Hort.*, 18 (1912), No. 419, pp. 112, 113).—This is a brief article based upon the experiments of Chancrin and Desriot (E. S. R., 25, p. 519), Boullanger (E. S. R., 27, p. 27), Demolken

(E. S. B., 26, p. 819), and Degruilly, indicating a distinct fertilizing effect of sulphur.

Some results obtained from the use of catalytic fertilizers, G. BERTRAND (*Bul. Assoc. Chim. Sucr. et Distill.*, 29 (1912), No. 10, pp. 681-688).—Plat experiments with various crops indicated beneficial effects from the use of manganese compounds. Aluminum nitrate and sulphate and boric acid were also tested to a limited extent but without decisive results.

Argentina guano, F. P. MABOTTA (*Rev. Indus. y Agr. Tucumán*, 2 (1912), Nos. 8, pp. 364-374; 9, pp. 399-409).—This guano is shown to be low grade, containing only 1.13 per cent of nitrogen and 1.11 per cent phosphoric acid. Its composition is compared with that of guanos from many different sources.

Fertilizing value of sewage sludge at Madison, Wisconsin (*Engin. and Contract.*, 36 (1911), No. 16, pp. 408, 409).—An analysis of dried sludge from the sewage disposal works of this city is reported, showing moisture 1.61, nitrogen 2.23, phosphoric acid 0.67, and potash 1.76 per cent. It is estimated that this sludge has a fertilizing value of \$3 per ton.

Commercial fertilizers, W. J. JONES, JR., ET AL. (*Indiana Sta. Bul.* 156, pp. 135-232, fig. 1).—This bulletin summarizes the Indiana fertilizer law, discusses the fertilizer trade in the State and the results of inspection, and reports analyses of fertilizers examined during 1911 as compared with those of previous years.

It is estimated that the sales of fertilizers in the State in 1911 amounted to 179,839 tons valued at \$4,352,269.27. There is shown to be an extension of the use of fertilizers in the State and a growing tendency to use high-grade fertilizers, to purchase on the plant-food basis, and to use more potash and fine-ground phosphate. The quality of the fertilizers offered for sale were the best since the amended fertilizer law went into effect.

A list of firms offering raw materials for home mixing is given.

Commercial fertilizers, B. H. HITE and F. B. KUNST (*West Virginia Sta. Bul.* 133, pp. 229-273).—This bulletin reports the results of analyses of commercial fertilizers inspected during the year 1911. The report shows "very few really serious failures to use materials of the quality guaranteed.

Fertilizing materials, F. T. SHURT (*Canada Expt. Farms Rpts.* 1911, pp. 183-198).—Analyses of ground rock, limestones, lime, marl, gypsum, mud, muck, peat, crematory ashes, soot, wheat straw ash, seaweed, and dogfish scrap are reported and discussed.

An act to regulate the sale of commercial fertilizers (*Massachusetts Sta. Circ.* 32, pp. 4).—This is the text of the law approved May 4, 1911. The principal new features of this law as compared with the old are provisions for inspection of agricultural lime; for guaranty of available phosphoric acid in Thomas slag by the Wagner method; an analysis fee of \$8 instead of \$5 each for nitrogen, phosphoric acid, and potash in fertilizers, and \$12 for agricultural lime; registration and payment of fee on or before January 1 instead of May 1; and the retention of duplicate samples by the station for one year.

The American fertilizer handbook, 1912 (*Philadelphia, 1912*, pp. 306, figs. 19).—This is an up-to-date compendium of useful information regarding the fertilizer business, including directories of the fertilizer trade and allied trades, as well as a review of patents relating to the production of fertilizers from 1830 to 1910, and special articles on the following subjects: The National Fertilizer Association; phosphate rock deposits of the United States and statistics of production, consumption, and price of phosphate rock; statistics of production, consumption, and price of potash salts, nitrate of soda, sulphate of ammonia, tankage and blood, and cotton-seed meal; the construction of a modern fertilizer

factory; reviews of the fertilizer materials markets in the United States and statistics of the consumption of fertilizers in the United States as a whole and in the different States; statistics of farm expenditures for fertilizers; the home mixing of fertilizers; a list of the state fertilizer controls; and numerous useful tables giving conversion factors, temperature corrections for hydrometer readings of sulphuric acid, fertilizer formulas, etc.

The world's consumption of fertilizers (*Rev. Sci. [Paris]*, 50 (1912), I, No. 1, pp. 22, 23).—This is a brief note on statistics published by Schneider elsewhere.

The figures are for 1908 and indicate the production in that year of 10,000,000 metric tons of phosphatic fertilizers, the greatest consumers of which were, in the order named, Belgium, Germany, Italy, and France; potash fertilizers corresponding to 500,000 tons of pure potash, the order of consumption of which by countries was Germany, Belgium, United States, France, and Austria; and nitrogenous fertilizers, including both sodium nitrate and ammonium sulphate, 2,500,000 tons, the order of consumption by countries being Belgium, Germany, England, France, and Italy.

Mineral fertilizers in Spain (*Engrais*, 27 (1912), No. 2, pp. 44-46).—It is shown that the use of mineral fertilizers is increasing in Spain, especially in Catalonia, and in 1909 amounted to 292,436,874 kg. (321,680 tons) valued at 47,818,017 pesetas (\$9,228,577.28). The larger proportion of the fertilizers used is imported from England, France, Belgium, and Germany. A few fertilizer factories have been established, of which three in Barcelona are of some importance.

Artificial fertilizer trade (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 100, pp. 369-373).—This is a brief review of the fertilizer trade in Russia, Denmark, Italy, China, Canada, and the West Indies.

AGRICULTURAL BOTANY.

A text-book of botany.—II, Ecology, J. M. COULTER, C. R. BARNES, and H. C. COWLES (*New York, Cincinnati, and Chicago, 1911, vol. 2, pp. X+435-964+0-4, figs. 535*).—This is the second and concluding volume of the text-book of botany from the Hull Botanical Laboratory of Chicago University (E. S. R., 24, p. 626). The plan outlined in the first volume has been maintained, the work being largely developed from courses in undergraduate study, though in the present volume the authors have included many recent observations and some new points of view.

This new text-book should prove especially adapted to the training of undergraduate students, as it contains the essentials for a foundation for work in almost any field of botany. The authors state that "it is not intended for reading and recitation," but it will doubtless prove suggestive to teachers and will aid students in correlating their observations with each other and with the known facts.

Types of British vegetation, edited by A. G. TANSLEY (*Cambridge, 1911, pp. XX+416, pls. 36, figs. 22*).—This book is the result of the work of the committee founded in 1904 to carry on a survey and study of British vegetation. An effort is made to recognize and describe the different types of plant community existing in the natural vegetation of the British islands, and to trace their relations to climate and soil and to one another. It is believed that the statements made about the relation of soils to the different types of vegetation, which are partly based on analysis and partly inferred, are essentially accurate and afford a sound basis of classification.

The practice of agricultural bacteriology, F. LÖHNIS (*Landwirtschaftlich-bakteriologisches Praktikum*. Berlin, 1911, pp. VII+156, pls. 3, figs. 40).—This book is intended to give a basis for investigations and demonstrations in agricultural bacteriology. An introduction to bacteriological technique is given covering work in the bacteriology of air, water, and feeds; of milk, butter, and cheese; of various fertilizing materials; and of soils. The appendix contains a key to common species of bacteria and practical suggestions for the laboratory. The work concludes with an index.

One thousand American fungi, C. MCLVAIN and R. K. MACADAM, revised by C. F. MULLSPAUGH (*Indianapolis*, 1912, rev. ed., pp. XXIX+749, pls. 71, figs. 174).—This book gives descriptions of about 1,000 species of toadstools, mushrooms, and other fungi, with notes on their distribution, habitat, poisonous or edible qualities, etc. Chapters are also given on toadstool poisoning and its treatment, recipes for cooking and preparing mushrooms for the table, raising mushrooms, etc.

Seeds and plants imported during the period from April 1 to June 30, 1911: Inventory No. 27 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 242*, pp. 99).—This inventory gives the usual data relating to seeds and plants introduced by the Office of Foreign Seed and Plant Introduction during the period indicated. About 900 numbers are included, much of the material having been collected by F. N. Meyer in western China.

Deciduous rootlets of desert plants, W. A. CANNON (*Science*, n. ser., 35 (1912), No. 903, pp. 632, 633).—A study of the roots of many perennials and a few annuals in the vicinity of Tucson, Ariz., showed that they have two sorts of rootlets, which have similar functions but usually an unlike fate.

A description is given of the root system of a desert shrub, *Franseria deltoidea*, in which, it is stated, the superficial roots bear, in addition to the usual type of rootlets, numerous adventitious rootlets in groups of about one-half dozen. These are formed during the moister season of the year and die during the succeeding dry period, seldom, if ever, persisting to form permanent roots. They are designated by the author as deciduous rootlets, and it is assumed that they are perhaps the first absorbing organs to function after the beginning of the rainy season. The rapid formation of these rootlets increases enormously the absorbing surface of the plants without increasing the distance of water transport. The importance of this in the physiology of the plant is quite evident. Nearly all perennials examined as well as some annuals exhibited a somewhat similar condition.

Setting of fruit and seed by cultivated plants, E. ZACHARIAS (*Ztschr. Bot.*, 3 (1911), No. 12, pp. 785-795).—The author discusses some of the factors operative in the setting of fruits and seeds by plants under cultivation and the transmissibility of characters acquired during this process. Among such factors the following are mentioned: (1) Stimulation due to rubbing of stamens by insect visitors, declared to be necessary to the production of pollen in some plants; (2) the stimulating effect of pollen from a different plant of the species, carried by insects or wind; (3) a proper balance between vegetative and reproductive activity; and (4) the relations existing between graft and stock. Degeneration and other aspects of heredity are also discussed.

Low temperatures with exclusion of air and viability of seeds, CLEMENS (*Naturw. Ztschr. Forst u. Landw.*, 9 (1911), No. 9, pp. 402-409).—The author investigated seeds of the fir, pine, cypress, oak, beech, maple, and ash. The seeds were divided into two series, of which one was kept from the air at a temperature of from 2 to 3° C., the moisture and carbon dioxide being removed as formed. Those of the other lot were kept in a dry room, subject to vari-

ations of temperature comparable to those outside. After varying periods of time portions of these lots were tested as to comparative power of germination in blotting paper, sand, and humus.

The treatment so far as tried showed favorable results, as compared with those from the exposed seeds, in preserving the viability of the seeds of the fir, oak, beech, and maple. The other seeds gave inconclusive or negative results.

The results of the germination of seed subjected to the action of various solutions, P. LESAGE (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 13, pp. 826-829).—A brief account is given of experiments with seed of the common garden cress to determine the effect of various solutions on germination. Seed were placed to germinate after soaking in varying strengths of alcohol for periods of from 1 to 50 hours.

The results show that in very concentrated solutions the seed retained their vitality to a considerable extent, while in more dilute ones they were destroyed. In still greater dilutions of alcohol no injury was noted.

A table is given showing the effect of treating seed in from 0.5 to 12.5 per cent solutions of absolute alcohol, the exposure varying from 1 to 50 hours. The strongest solution, even when employed for 50 hours, destroyed only 3 out of 10 seed, while after 6 hours in the 0.5 per cent solution none germinated and only 2 remained alive in the lot that was treated that long. For the 1 per cent solution none germinated after 3 hours' soaking, nor did any germinate after 2 hours' treatment in the 2 per cent solution, but as the strength of the solution was increased the period of soaking could be likewise increased without apparent injury.

The author discusses at length the curve which shows the relation between the strength of solution and the length of exposure, and thinks that possibly some data can be secured on the sterilization of seed without appreciably injuring their vitality. Other experiments are briefly noted in which cress and radish seeds were subjected to solutions of common salt and comparable curves were obtained.

The effects of caffeine upon the germination and growth of seeds, F. RANSOM (*Bio-Chem. Jour.*, 6 (1912), No. 2, pp. 151-161).—Caffein in aqueous solutions, varying in strength from 1 to 0.0001 per cent, was applied to various seeds before planting in order to test its effects in retarding or stimulating germination and growth.

The results obtained quite uniformly attest the injurious effects of caffeine. At 1 per cent concentration, germination was entirely prevented in some instances, and both germination and growth were greatly retarded by strengths as low as 0.01 per cent. The only exception, that in case of nasturtium, was ascribed to the density of the seed covering which was supposed to limit the access of caffeine. More dilute solutions of caffeine alone or in association with other substances had no perceptible accelerating effect. The investigations are being continued.

Water and light as factors in vegetation, T. PFEIFFER, E. BLANCK, and M. FRÜGEL (*Lunds. Vers. Stat.*, 76 (1912), No. 3-6, pp. 169-236, figs. 4).—These investigators carried out in the spring of 1910 a series of 112 experiments on the effects of water and light on growth products of oats, the more significant results of which may be summed up as follows:

The water content of the soil bears a more important relation to the formation of crop products than has yet received adequate recognition. The nitrogen content of the crop is increased with the addition to the soil of this nutritive substance. The establishment of maximum values for the profitable utilization of plant food is considered to be of importance as regards agricultural products. Self-shading through luxuriant growth interferes with the results of other

variant factors, preventing their full expression in augmented crops. The point where this interference begins is difficult to determine. The law of minimum is a straight line function only so long as optimal vegetative factors operate. Larger water utilization affects the relative solid content of crops negatively. About 364 gm. of water was used per gram of dry substance formed above ground.

Relation of the daily march of transpiration to variations in the water content of foliage leaves, B. E. LIVINGSTON and W. H. BROWN (*Bot. Gaz.*, 53 (1912), No. 4, pp. 309-330).—Attention was called in a previous publication (*E. S. R.*, 18, p. 328) to differences existing between the time of the maximum evaporating power of the air and the maximum transpiration in certain plants. From a study of the relation of transpiration to variation in the water content of leaves the authors conclude that there can remain little question that green plants when subjected to relatively great diurnal evaporation intensity frequently exhibit a marked fall in foliar moisture content by day and a corresponding rise by night.

The experiments reported were made in Arizona and the authors were unable to compare the conditions with those of more humid and cooler regions. It is stated that, so far as evidence is at hand, it is probable that the cause of this diurnal minimum in foliar moisture rests in the phenomenon of incipient drying, brought about wherever the ratio of water loss to water supply in the leaves is rendered less than unity. Although the experiments would seem to indicate that the external factor which controls this diurnal fall of leaf moisture is evaporation intensity, the true controlling condition, the authors believe, is more probably the ratio of water supply to water loss. The structure of the plant, the moisture conditions of the soil, and the intensity of evaporation and of solar illumination appear to make up the controlling environmental complex.

It is thought probable that the diurnal, nonstomatal retardation of the escape of water vapor from green leaves in sunlight is the effect of a lower vapor tension within the internal atmosphere of the leaves and over their surfaces. This lower vapor tension is brought about by the increased surface tension and decreased evaporation surface which accompanies a lowered water content of the internally and externally exposed cell walls.

The authors think that in the diurnal minimum in the water content of foliage leaves a criterion can be established that may prove of importance to scientific agriculture, in arid regions at least. By this it may be possible to determine indirectly and somewhat simply the status of the water relations of the plant and to foresee the need of increased soil moisture long before the cessation of growth or actual wilting becomes manifest.

Stimulation movements of plants, E. G. PRINGSHEIM (*Die Reizbewegungen der Pflanzen*, Berlin, 1912, pp. VIII+326, figs. 96).—This book is intended as an introduction to the study of the physiology of stimulation in plants, being somewhat more full than the treatment usually given in text-books but not so detailed and specialized as that found in more technical treatises. Free movement, protoplasmic streaming movements, growth and turgor movements, and the various tropisms receive separate and proportional discussion. The work concludes with a somewhat full bibliography and an index.

Nitrogen assimilation under sterile conditions of plants from nitrates, ammonium salts, and asparagin, G. G. PETROV (*Izv. Moskov. Sel'sk. Khoz. Inst. (Ann. Inst. Agron. Moscow)*, 17 (1911), No. 4, pp. 141-178, figs. 3).—The investigator cultivated maize plants on nets suspended in sterile tubes in a stream of carbon dioxide over nutritive solutions of (1) calcium nitrate, (2) ammonium sulphate, and (3) asparagin. Both stalks and roots were analyzed, and determinations were made of the total nitrogen content, also of that found as

albumin, asparagin, and ammonia. On the basis of the findings from these experiments, in connection with the data of related literature, he reaches the following conclusions:

In the plant tissues the nitrates are reduced to ammonia during the oxidation of carbohydrates. The ammonia so produced taken on the forms of various amid compounds, in some parts, of asparagin; while that absorbed from outside passes over in large part into asparagin. Asparagin is absorbed by the plant and appears as a good source of nitrogen in this series of experiments.

The assimilation of nitrates in plant cells, O. LOEW (*Chem. Ztg.*, 36 (1912), No. 7, pp. 57, 58).—Considering the questions of (1) what is the first transformation product of the nitrates in the manufacture of protein and (2) what factors are operative in the reduction of such nitrates, the author takes the negative view as to the formation of hydroxylamin and the necessity for light as a source of energy for the reduction process. The results of several investigations are presented with his views, in brief as follows:

Previous experiments conducted, supervised, or cited by the author are claimed to show that (1) contact with platinum sponge is sufficient in the absence of light to reduce magnesium nitrate with glucose in an over-saturated solution of potassium hydrate or to reduce potassium nitrate in solution with dextrose; (2) here is a process analogous or similar to one that goes on in the living cell; (3) absence of light did not prevent, nor did access of light accelerate, the reduction of sodium nitrate in the development of *Penicillium glaucum* cultures in a nutrient medium with glycerin; (4) in various roots kept growing in a cool and totally dark chamber the nitrates were steadily decreased in quantity with corresponding increase of protein; and (5) in case of young etiolated barley plants kept 7 days in a nutrient solution containing 0.2 per cent of sodium nitrate, and then for an equal time in cane sugar solution, maintained at 10 per cent strength and at from 10 to 20° C. and half saturated with calcium sulphate, every trace of the nitrate disappeared from the plants in complete darkness with increase of protein, while the control plants showed strong nitrate reaction. It is held that (6) the light energy which breaks up nitric compounds, for example, nitric acid with evolution of nitric peroxid, has its parallel and equivalent in energy developed by the so-called intramolecular (anaerobic) respiration; (7) if hydroxylamin were formed from nitrates through reduction, its toxic influence upon cells, even in highly dilute solutions, would reveal its presence, the same being true also of some other suggested products; (8) the proteins of living cells are so labile that the least disturbance originates a series of changes which extend throughout the protoplasm; (9) the kinetic energy of the living protoplasm, lowering to more stable groupings, is sufficient for the more difficult work of reducing sulphates; and (10) most roots are obliged to utilize their nitrates in the absence of light and they are probably not carried to the leaves for reduction before utilization.

The physiological function of magnesia in green plants, L. BERNARDINI and G. MORELLI (*Rend. Soc. Chim. Ital.*, 2. ser., 3 (1912), No. 13, pp. 349-353; *Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5. ser., 21 (1912), I, No. 5, pp. 357-362).—In continuation of work previously noted (E. S. R., 21, p. 30; 22, p. 433), the authors here report their conclusion that magnesium probably plays an important rôle in plant development by its combining with phosphoric acid in the formation of both storage and utilization materials. This is said to be evidenced by the behavior of the chlorophyll in relation to changes in the magnesium phosphate and the germination of seeds in the presence of light.

Injurious effects of illuminating gas upon greenhouse plants, E. M. WILCOX (*Ann. Rpt. Nebr. State Hort. Soc.*, 42 (1911), pp. 278-285, *figs. 11*).—A descrip-

tion is given of the injury to plants in greenhouses at Omaha, Nebr., which is attributed to the effect of gas from a break in a gas main across the street from the greenhouses. Carnations were particularly attacked, and some peculiar manifestations are described.

In the variety Scarlet Glow 3 weeks after the original injury the styles were found projected from the tips of the buds, which did not show any tendency to open. In other varieties the buds that had commenced to open remained closed and the calyx dried over the apparently dead corolla within. Flowers that were open at the time were killed outright.

Defoliation did not occur on carnations, although on many other plants this was the most characteristic symptom noted. Roses, coleus, and geraniums were more or less defoliated and the terminal shoots often destroyed. Considerable injury was noted on different varieties of lily as well as other plants. It is stated that carnation rust was much more abundant on plants subject to the injury than on others, and it is thought that the effect of the gas rendered them less resistant than normally to the attack of parasitic fungi.

The tarring of roads and its effect on the neighboring vegetation, C. L. GATIN (*Ann. Sci. Nat. Bot.*, 9. ser., 15 (1912), No. 2-4, pp. 165-232, pl. 1, figs. 12).—As secretary of the commission appointed to investigate this subject, the author reports at length upon their investigations, experiments, and conclusions. A study was made of the different substances used for the surface treatment of roads, most of them having coal tar as a basis. The literature of the subject is reviewed, and the results of extended series of observations and experiments are given. Some of the features of the investigation have already been noted (*E. S. R.*, 25, p. 128; 26, p. 432).

All the results tend to show that many trees, shrubs, garden plants, and flowers suffer injury from the fumes given off by the tar and also from the dust arising from the treated roads. The injury seems to be proportional to the distance from the road, the amount of travel, percentage of phenol in the compound, and the insolation of the plants. The effect on the plants is shown in the fading of the leaves, which are spotted and blackened. The cells are plasmolyzed, the chlorophyll disappears, and in its place are found drops of oil and tannin. The whole plant becomes stunted, the development of fibrovascular tissues is reduced, and the formation of reserve starch checked. Marked differences in resistance to injury on the part of some plants is noted, those with thick epidermal cells being less injured than others.

Chemical protection of plants against freezing, I. N. A. MAKSIMOV (*Ber. Deut. Bot. Gesell.*, 30 (1912), No. 2, pp. 52-65).—From a series of experiments instituted by the author and not yet complete, preliminary conclusions are drawn in substance as follows:

The introduction of organic substances of nutrient character (carbohydrates, alcohols, acetone) into the plant cell may markedly heighten its resistance to cold, even in case of tropical plants. This protective effect is not in direct proportion to the osmotic pressure and the lowering of the freezing point; it is considerably more rapid than the latter change. Different substances protect in different degrees. The sugars stand highest; then come glycerin, the alcohols, and acetone; mannite stands very low in this scale. The removal of the protective contents restores the original degree of resistance.

A new method of cultivating some of the higher plants in sterile media, R. COMBES (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 14, pp. 891-893, figs. 2).—The author illustrates and describes a form of apparatus devised for growing plants, in which the roots are kept in a sterile medium throughout the entire period of the experiment while the aerial organs remain free in the air.

FIELD CROPS.

[Field crops work at the Canadian experiment stations and farms in 1910], W. SAUNDERS, J. H. GRIEDALE, W. T. MACOUN, C. E. SAUNDERS, F. T. SHUTT, H. T. GÜSSOW, J. A. CLARK, R. ROBERTSON, J. MURRAY, A. MACKAY, W. A. MUNRO, W. H. FAIRFIELD, G. H. HUTTON, T. A. SHARPE (*Canada Expt. Farms Rpts. 1911*, pp. 7-9, 21-24, 33, 34, 37-50, 84-100, 122-128, 131, 132, 143-159, 165-168, 177-181, 262-267, 272-274, 295-306, 317-333, 352-380, 397-413, 435-440, 443-474, 480-502, 505, 506, 511-519, pls. 5, figs. 2).—This continues work already noted (E. S. R., 24, p. 432).

The various farms conducted variety tests of corn, oats, 2- and 6-rowed barley, spring, winter, and durum wheat, emmer, spelt, flax, spring and winter rye, millet, peas, grasses, clovers, mangels, turnips, carrots, sugar beets, potatoes, field peas, and field beans. Mixed sowings of peas and various small grains were also tested. Tables state the yields obtained in these tests and the more important cultural and varietal data obtained from some of them.

Dates of sowing and ripening in Alberta of varieties of spring wheat, oats, 2- and 6-rowed barley, peas, carrots, turnips, sugar beets, mangels, potatoes, and corn are reported in tables, together with yields and other data on the crops obtained.

Tables state some of the results of tests of 1,547 samples of wheat, barley, oats, rye, peas, beans, flax, grass, maple, and ash seeds from different Provinces. They were tested to determine the climatic conditions favorable to the production of seed of high vitality, and to test the influence of the character of the season on vitality. Tests of the decrease of vitality of grains through age indicated that the loss is retarded by low temperature. Winter wheat retained a high germinating power longer than spring varieties, but after the sixth year the specimens in both warm and cold storage had almost entirely lost their germinating power. The decrease was striking in the fourth year, and still more marked in the fifth year. Oat varieties showed fairly good vitality for 5 years, but were quite low in the sixth and seventh years.

The results of rotation and fertilizer tests are tabulated as in previous years. The corn, oats, clover hay rotation again gave the highest profit, \$9.34 per acre.

Potato spraying and change of seed experiments gave results in harmony with those of previous years. Seed of 11 varieties grown at Indian Head produced yields averaging 368 bu. 30 lbs. per acre, as compared with 90 bu. and 42 lbs. secured from Ottawa-grown seed of the same 11 varieties.

In the sixth year's work on the effect of soil moisture on the composition of grain it appeared that irrigated barley had a low protein content as compared with that from dry farming plats. Wheat was probably less affected in this particular.

Analyses of turnips, mangels, and sugar beets are reported. Eleven years' analyses of 2 varieties of mangels indicate that their composition is largely controlled by heredity, as the relative position of the 2 varieties always remained unchanged. Among 11 varieties of turnips tested at the Prince Edward Island station, 55 per cent of the roots of Magnum Bonum were affected by club root as compared with from 73.5 to 100 per cent in case of the other varieties.

At the Nova Scotia farm, the addition of 300 lbs. of artificial fertilizers per acre to manure applied to each of a number of turnip varieties gave financial returns ranging from losses of \$4.56 to a gain of \$1.84 per acre as compared with returns obtained from the plats which received only the manure. Similar tests with mangels showed gains ranging from 44 cts. to \$6.60 per acre.

Wheat grown at the Brandon farm from smutty seed treated with either formalin or bluestone by sprinkling or dipping was entirely free from smut.

while the untreated seed produced a crop with 19 per cent of the heads smutted. Home-grown seed of 1 variety of mangels produced over $1\frac{1}{2}$ times as great a crop as did commercial seed of the same variety, but there was little difference in case of another mangel variety and 2 turnip varieties.

At the Indian Head farm an unpacked acre produced 1 bu. 32 lbs. more peas than did soil packed once with subsurface packer. The oat yield was apparently raised from 81 bu. 21 lbs. to 88 bu. 17 lbs. by packing once, and the barley yield from 64 bu. 28 lbs. to 69 bu. 28 lbs. Barley on soil packed twice yielded over a bushel less than on soil packed only once. The first year's results of a series of rotation tests on summer fallowed land are reported.

On the nonirrigated farm at Lethbridge, land harrowed April 9 yielded 18 bu. 48 lbs. of winter wheat per acre as compared with 16 bu. 15 lbs. on that not harrowed. Wheat sown September 1 and 15 produced heavier yields than that sown on other dates ranging from July 15 to December 1. Sowing at the rate of 75 lbs. per acre resulted in a higher 3-year-average yield than did any of the 7 other rates tested ranging from 15 to 120 lbs. In case of spring wheat 105 lbs. gave the highest 3-year-average yield. From 60 to 105 lbs. of oats and from 75 to 105 lbs. of barley appeared to be the best rates of sowing. Higher potato yields followed planting in rows $2\frac{1}{2}$ or 3 ft. apart than $3\frac{1}{2}$ or 4 ft. apart, and 2 ft. apart in the row invariably excelled 1 ft. apart.

On the irrigated farm at Lethbridge, in rate of seeding tests, the highest 3-year-average yields followed sowings of from 75 to 105 lbs. of spring wheat, from 90 to 105 lbs. of oats, and from 45 to 60 lbs. of barley. Alfalfa seeded at the rate of 10 lbs. per acre produced about the same yield as when sown at higher rates up to 30 lbs. per acre. Spring and fall irrigated winter wheat yielded 18 bu. 5 lbs. and 21 bu. 40 lbs. per acre, respectively. A mixture of alfalfa, timothy, and rye grass produced a little higher 2-year-average yield than a mixture of alfalfa and rye grass, and about 0.8 ton per acre more than a mixture of alfalfa and timothy. Soil-inoculated clover produced more than twice as much as that not inoculated and over $1\frac{1}{2}$ times as much as that inoculated with a laboratory culture.

At the Lacombe farm, in 1910, the highest yield obtained in rate of sowing tests followed sowings of 2 bu. of winter wheat, $2\frac{1}{2}$ bu. of spring wheat, $2\frac{1}{2}$ bu. of oats and from $2\frac{1}{2}$ to 3 bu. of barley. The results of date of sowing tests are also reported, and a table states the yields secured in a rather inconclusive test of acid phosphate, muriate of potash, and nitrate of soda in various mixtures for spring wheat. The use of a surface soil packer apparently increased the barley yields by about 5 bu. per acre. Among 8 varieties or strains of alfalfa, spring sown in 1909, *Medicago falcata* and Grimm from Excelsior, Minn., showed in 1910 that about 100 and 95 per cent of their plants, respectively, had survived the winter as compared with from 20 to 92 per cent among the others tested. Alfalfa inoculated with soil and with a commercial culture yielded 9,216 and 7,552 lbs. of green material per acre, respectively.

[Field crops at the Florida Station], J. M. SCOTT (*Florida Sta. Rpt. 1911, pp. XX-XXVI, figs. 2*).—In a test of 8 varieties of cowpeas, each of which was sown broadcast and also planted in rows and cultivated, Brabham, Peerless, and Iron produced the highest yields. Brabham and Iron were the only varieties found to be resistant to root-knot. Broadcast sowings gave greater yields in the case of 3 varieties, but averaged much lower when all varieties were considered. Broadcasting required 50 per cent more seed but gave a better quality of hay for horses and mules because it was mixed with crab grass.

Among 80 soy bean varieties tested Mammoth, Black, Nelson, Yellow, Canton, and Edwards are noted as worthy of further trial. The Yokohama bean

ripened its seed much earlier than the velvet or Lyon bean and is recommended as a cover crop in citrus groves because it does not produce so rank a growth.

Japanese cane cultivated 2, 4, and 6 in. deep yielded 16.6, 16.5, and 18 tons of green material per acre, respectively, as compared with 17 tons on a plat cultivated 6 in. deep at first and 2 in. deep afterwards. In a test of 8 applications of fertilizers (E. S. R., 24, p. 733), in 1909 much the highest calculated yield of sirup followed an application of 112 lbs. dried blood, 84 lbs. sulphate of potash, and 224 lbs. of acid phosphate. This plat also produced one of the highest yields in 1910.

Hand-selected Lyon bean seed yielded 11.9 bu. per acre as compared with 10.96 bu. in case of seed taken as it came from the huller. The kudzu vine yielded about 2½ tons of cured hay per acre at 2 cuttings, but as the vines made almost no growth after the second cutting, the author believes that 2 cuttings per season is more than the plant will stand. This vine has not given promising results thus far.

The fourth consecutive crop of velvet beans yielded 13.9 bu. of shelled beans per acre as compared with 21.76 bu. on an adjoining plat which had not previously grown velvet beans. White velvet beans yielded 15.23 bu. of shelled beans per acre. Hand-selected seed yielded 11.98 bu. as compared with 16.1 bu. in case of seed taken as it came from the huller.

In a test of 9 varieties of corn, the Station, Evans, Poorland, and Rawls varieties gave the highest yields in 1910. Winter frost injured the guinea grass tested. Guinea grass fertilized with nitrate of soda, muriate of potash, and acid phosphate yielded 3,370 lbs. of cured hay per acre, whereas a plat in which dried blood was substituted yielded but 2,341 lbs. Para grass yielded 2,400 lbs.

Report on the agricultural stations in the Central Provinces and Berar for the year 1910-11 (*Rpt. Agr. Stas. Cent. Prov. [India], 1910-11, pp. 115, pls. 2*).—This is a report of work at the experimental farms at Powarkhera, Nagpur, Akola, Raipur, Telinkheri, Nawagaon, Ramtek, Bhandara, Chanda, and Chhattisgarh, with results largely in harmony with those already noted (E. S. R., 26, p. 232).

At the Powarkhera farm the use of 20 lbs. of nitrogen applied in calcium cyanamid or calcium nitrate was followed in each case by a much higher wheat yield than the same amount of nitrogen applied in saltpeter, ammonium sulphate, a mixture of the two, oil cake, or farmyard manure; by sorghum yields of 778 and 840 lbs. of grain per acre as compared with 570 lbs. on the check plat; and by yields of seed cotton of 221, 204, and 144 lbs. per acre, respectively. A somewhat higher hay yield followed the application of a mixture of 4¼ lbs. of superphosphate and 25 lbs. of ammonium sulphate, than the same mixture in addition to 10 lbs. of sulphate of potash, or various other mixtures.

In a variety test of peanuts, Chinese No. 2 and Egyptian produced the highest yields, and the latter is reported as entirely free from the "Ticca disease," which slightly affected 3 varieties. Other work at this farm included work with various implements, oats, wheat, gram (*Cicer arietinum*), rye, sugar cane, soy beans, velvet beans, flax, sesame, pigeon peas, Jalalia, and other crops.

At the Akola farm applications of night soil after the Meagher system applied every third year, bone dust and saltpeter, or 1-year-old poudrette, in amounts supplying 20 lbs. of nitrogen per acre, were followed by 5-year average rice yields decreasing in the order named. Other applications tested were castor cake, dried leaves of trees, calcium cyanamid, cattle dung, and 640 maunds (about 26.28 tons) of tank silt per acre. Equal applications of the same materials were used in other tests with rice, with rather similar results. Planting single seedlings in holes 6 in. apart produced much higher yields than when bunches were planted.

At the Raipur farm the application of 20 lbs. of nitrogen in night soil after the Meagher system was followed by greater yields of rice and higher profits than followed applications of 1-year-old poudrette, castor cake, dried leaves, cattle dung, or a mixture of bone dust and saltpeter. Financial losses followed the use of calcium cyanamid, bone dust, and a mixture of bone dust and sulphate of ammonia in this experiment. The application of 30 lbs. of nitrogen to irrigated wheat resulted in financial losses in each case except when a night soil was used, although the use of castor cake and of 4 applications of calcium nitrate to irrigated wheat was followed by substantial increases in yield.

Applications of 20 lbs. of nitrogen per acre in night soil, bone dust, a mixture of bone dust and saltpeter, and 1-year-old poudrette were followed by greater 5-year average yields of transplanted rice under irrigation than when dung, castor cake, dried leaves, calcium cyanamid, or a mixture of bone dust and sulphate of ammonia were used. Two other tests of the same fertilizers on transplanted rice under irrigation gave somewhat similar results. In case of plantings of 1, 2, or 3 seedlings or bunches of rice seedlings in holes 6 in. apart both the yield and the profit decreased as the number of seedlings per hole was increased.

[Fertilizer and variety tests], E. THOMPSTONE (*Dept. Agr. Burma, Rpt. Mandalay Agr. Sta., 1910-11, pp. 38*).—In a test of bone meal, nitrate of soda, saltpeter, cotton cake, and farmyard manure in various amounts and mixtures as fertilizers for rice, the 3 highest grain yields were produced by the plots to which farmyard manure was applied. In 2 different localities higher grain yields were produced when the paddy straw was plowed under than when it was burned, but still higher yields were secured when 12,000 lbs. of cattle manure per acre was applied. An application of 6,000 lbs. of cattle manure per acre was followed by much greater grain and straw yields than when hemp, jute, or dhaincha were plowed under as green manures.

A greater yield was obtained after dhaincha than after San hemp or indigo used as green manures.

The results of tests of 16 sorghum varieties, 13 peanut varieties, 6 soy bean varieties, 4 cotton varieties, and of a number of miscellaneous crops are reported.

[Crops and green fodder in winter], G. MARKS (*Agr. Gaz. N. S. Wales, 23 (1912), No. 2, pp. 148-155, pls. 2, figs. 3*).—This article reports the results of variety tests of wheat, oats, rye, and barley on 5 farms. The use of $1\frac{1}{2}$ cwt. of superphosphate per acre apparently doubled the yield of oats and almost doubled the yield of a mixture of wheat and vetch.

Cooperative experiments of the department of agronomy, M. F. MILLER and C. B. HUTCHISON (*Missouri Sta. Circ. 54, pp. 151-162, fig. 1*).—This circular gives directions for the use of farmers who cooperate with the station in fertilizer and inoculation tests of alfalfa, variety tests of corn, oats, wheat, and barley; tests of grass and clover mixtures for the Ozark upland, fertilizers for potatoes, and the adaptation of crimson clover and vetch to Missouri conditions are also discussed.

Emergency crops for overflowed lands in the Mississippi Valley, B. KNAPP (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 756, pp. 8*).—A brief review of agricultural problems growing out of the flood of 1912 is followed by suggestions for producing field and garden crops under the unusual conditions following the flood.

Top dressing grass lands.—The sowing of red clover, A. E. GRANTHAM (*Delaware Sta. Bul. 95, pp. 7*).—Suggestions are given on the spring sowing of clover seed and the top dressing of grass land.

In tests at the station, poor land seeded to a mixture of red clover, alsike clover, and timothy in September was top dressed during each of the two succeeding years with nitrate of soda, acid phosphate, and muriate of potash, singly or in various combinations and amounts. Nitrate of soda gave the largest returns when used singly or in combination, and no application without nitrogen paid for the fertilizers used.

Separation of Swiss cereals into different types, G. MARTINET (*Ann. Agr. Suisse*, 12 (1911), No. 4, pp. 223-253, figs. 5).—The author states that Swiss cereals are mixtures of types because of variation, mutation, and hybridization. He states in detail the observations made and the data gathered in separating types of oats, barley, and wheat during the period 1906-1910.

[Small grain varieties recommended] (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 2, pp. 137-140).—These pages present lists of the varieties of wheat, oats, barley, and rye recommended by the department of agriculture of New South Wales. The recommendations were made by experimentalists and managers of the farms of the department in conference with others.

Alfalfa seed production, J. M. WESTGATE, R. MCKEE, and M. W. EVANS (*U. S. Dept. Agr., Farmers' Bul.* 495, pp. 36, figs. 14).—This publication is intended to set forth the best known methods for the successful production of alfalfa seed. The topics discussed include the soil, climatic, and other conditions affecting alfalfa seed production, methods of managing fields, harvesting the seed, utilizing the straw, cultivating in rows for seed, weeds, seed adulteration, and the commercial aspects of seed production, together with notes by F. M. Webster on the insect enemies of alfalfa seed.

The authors have found that the most successful crops of alfalfa seed are produced when a relative shortage of soil moisture accompanies comparatively high temperatures while the seed is maturing. The soil moisture must be sufficient to permit the setting of seed but not great enough to start new vegetative growth for the succeeding crop. This narrow margin is the principal cause of the great uncertainty in the alfalfa seed crop.

Seed 1, 5, and 10 years old gave germination tests of 93, 68, and 44 per cent, respectively. The following table summarizes the results of 5-day tests of seed about 3 months old conducted to determine the proper stage at which to cut for seed:

Condition of seed as affected by stage of maturity.

Stage of maturity.	Dead.	Alive.	Hard.	Capable of sprouting promptly.
	Per cent.	Per cent.	Per cent.	Per cent.
Pods green and not yet fully filled out.....	94	6	0	6
Pods green but full size.....	73	27	12	15
Pods just turning from green to a light-straw color; plump...	17	83	58	25
Pods turned to a light brown; plump.....	11	89	69	29
Pods turned brown; fully matured.....	9	91	68	23

[Alfalfa seed in color, germination, and structure], E. MACKINNON (*Agr. Gaz. N. S. Wales*, 22 (1911), No. 12, pp. 1058-1063, fig. 1).—The author summarizes earlier work on this subject giving numerous citations to authorities quoted. Yellow seed averaged 92 per cent in germination tests as compared with 44 per cent for brown seed, 9.3 for yellow hard seeds, and 4 per cent for brown hard seeds.

Second generation of the cross between velvet and Lyon beans, J. BELLING (*Florida Sta. Rpt.* 1911, pp. LXXXII-CIV, figs. 17).—The characters of the

first hybrid generation have already been noted (E. S. R., 25, p. 436). From data herein presented on the characters of the second hybrid generation, the author draws conclusions which follow:

Out of 316 plants, 43 were distinctly earlier in flowering than either the Lyon or velvet beans grown in the same field, while 44 were much later. This character evidently segregates. The pods and beans of some plants were much larger than those of the Lyon bean, while those of other plants were smaller than in case of the velvet bean. This character segregates, possibly with two factors.

The hairs on the shoots segregated into dark, velvety, and other mixed or lighter classes which were not readily separable in the field. The ratio of lighter to dark velvety hairs was 256:51. Dark velvety shoots were more or less closely coupled with smooth convex leaves, dark velvety pods, partly with late flowering, and in some cases with abnormal flowers in small bunches, dropping of flowers, few pods to the bunch, and few seeds to the pod. The purple color of the wings and, to a less degree, of the standard segregated in the ratio of 3:1. The hairs on the pods segregated into long stiff, short stiff, and long dark weak hairs with some intermediates.

The lengths of the 5-seeded pods gave a curve divided in the ratio of 3:1. The opening of pods appeared to be a dominant character. The ratio of plants with all closed pods to those with one or more open pods was 1:3. The average weight of one seed reckoned as a percentage of the average weight of a 5-seeded hull gave a number for use in comparison of the proportion of hulls to seeds. This figure is low in the Yokohama bean, higher in Lyon, and highest in the velvet bean. Among 115 segregates it gives a curve with two maxima, one beyond the velvet bean. The average number of beans in the velvet and Lyon pods were about the same, but the plants of the second generation hybrid varied greatly in both directions in this respect.

The crops of good seeds produced by the segregates showed much more variation than did those produced in the same field by parent strains of Lyon and velvet beans. Some plants produced seed which appeared more subject to mold than was the case with either Lyon or velvet, and the same was perhaps true of wrinkled seed. Seeds from different plants, presumably of the same pure line, showed greater variation in average dimensions than did different pickings from the same plant. Bean length was correlated with pod length and segregated in the ratio of 3:1. Breadth and thickness did not visibly segregate independently of the lengths, but the shorter beans were broader and thicker relatively to their lengths than were the long seeds. The average breadth was about the average of the Lyon and velvet strains. Mottling perhaps resulted from 3 independent factors, and the ratio of mottled to unmottled beans was apparently 63:1.

A statement of the technique used in the crossing of stizolobiums is followed by brief notes on pure lines of velvet beans, some corn crosses, and analyses of the juice of West Indian sugar canes. B. 208 stood highest in Brix reading and in percentage of sucrose as indicated by the polariscope.

Corn production, G. ROBERTS and E. J. KINNEY (*Kentucky Sta. Bul. 163, pp. 173-200, figs. 4*).—Directions are given for corn production in Kentucky, including soils and fertilizers, seed improvement, cultural methods, and harvesting. Census figures showing the yield of corn in Kentucky in 1909, by counties, are appended.

The results of a test of rates of seeding and methods of planting are regarded as indicating "that in a favorable season 3 stalks per hill will give a higher yield than 2 stalks, and that drilled corn yields better than corn planted in

hills when the rates of seeding are equal." When the corn was drilled, however, planting 12 in. apart, equivalent to 4 stalks per hill, gave a still higher yield in 1910.

Cotton and cotton culture, O. O. CHURCHILL and A. H. WRIGHT (*Oklahoma Sta. Bul. 97, pp. 3-23, figs. 7*).—This bulletin is intended to furnish practical information on cotton culture under Oklahoma conditions. It is based on experimental work at the station, and variety tests are reported.

In 1911, Simpkin Prolific, English Ounce Boll, and Extra Big Boll produced the highest yields and Texas Storm Proof stood rather low, although it stood quite high in average yield among the varieties tested during the period 1909-1910. It is the only variety whose yield is reported for each year during this period.

Directions for cotton production in Oklahoma are followed by a discussion of insect pests and by maps showing the cotton producing area of the State, the average rainfall at the various recording stations, and the dates of the last spring and first fall killing frosts.

Experiments with varieties of cotton, J. N. HARPER and F. G. TARBOW, JR. (*South Carolina Sta. Bul. 162, pp. 3-8*).—Notes on 27 varieties of cotton tested during 1911 are presented.

The seeding of cowpeas, M. F. MILLER (*Missouri Sta. Circ. 53, pp. 147-150*).—Directions for seeding, harvesting, and threshing cowpeas in Missouri.

Thousand-headed kale and marrow cabbage, L. J. CHAPIN (*Washington Sta. Bul. 6, spec. ser., pp. 8, fig. 1*).—The feeding value, culture, and seed production of these crops are discussed, with methods of combating the root maggot. See also a previous note (*E. S. R., 23, p. 436*).

Changes in the composition of the oat plant as it approaches maturity, T. E. KEIRT and F. G. TARBOW, JR. (*South Carolina Sta. Bul. 163, pp. 16*).—Analyses of samples taken almost daily from May 11, when the heads were part in bloom and part in boot, until May 26, when the grain was hardening, indicate the changes in composition of the oat plant during that period. The data obtained are presented in tables, from which the following conclusions are drawn:

During the last few days of maturity of the plant the increase in total dry matter was rapid. Prior to that time it was regular but not rapid. From the beginning of blooming to the time of hardening, the seed increased from 17 to 39 per cent of the entire plant by weight, and the leaves decreased from 47 to 28 per cent of the plant. The straw percentage reached its maximum when the oat was in the milk stage. The protein in the seed glume, leaf, and straw increased until the milk stage after which it decreased rapidly. The water content remained high and rather constant during the blooming period, decreased suddenly at the beginning of the milk stage and then remained very constant until the oat began to turn when it again decreased. The ash reached its maximum for the entire plant when the protein reached its maximum. Very little starch formed before the first signs of milk, the carbohydrates being present before that time as invert and reducing sugar, mainly the latter. The sugar percentage decreased during the milk stage but increased slightly with the approach of maturity.

In order to obtain a nitrogenous forage, cutting should be done in the early milk stage, but if a forage high in carbohydrates is sought the grain should be cut at the beginning of the dough stage, since there is a rapid decrease in feeding value after this time in spite of the continued increase of starch in the seed.

The assimilation of phosphorites by oats and buckwheat, V. I. SAZANOV (*Izv. Moskov. Sel'sk. Khoz. Inst. (Ann. Inst. Agron. Moscow), 17 (1911), No. 1, pp.*

100-112, figs. 4).—These pages report the phosphoric acid contents of phosphorites from different regions. Pot tests to determine their assimilability by oats and buckwheat on sand and clay soils were conducted, and tables present the data obtained.

A new basis for estimating the value of potatoes, D. ZOLLA (*Rev. Gén. Sci.*, 23 (1911), No. 22, p. 887).—The author suggests the use of the microscope in determining the value of potatoes for specific purposes. Fine grained potatoes should be planted for the table crop. Starch potatoes for manufacturing purposes differ histologically from table potatoes in that their tissues are less compact and their cells large and rich in starch.

Bye selection at Svalöf, 1910, E. W. LJUNG (*Sveriges Utsädesför. Tidskr.*, 21 (1911), No. 6, pp. 321-323).—These pages briefly summarize the results of 21 comparative experiments. A table states the grain and straw yields secured, the weight per bushel and per 1,000 kernels, the date of harvest, and the degree of resistance to lodging.

The quality of grain in the season 1910-11, E. SCHAFFNIT (*Illus. Landar. Ztg.*, 51 (1911), No. 99, pp. 911, 912).—Analyses of many rye samples of an abnormal orange-yellow color showed that they were higher in protein content than the usual brown seeds. In germination they tested 98 per cent or over but in growing tests only about 79 per cent.

During this same dry season red, yellowish-red, or even violet-colored straw occurred. It was attributed to the accumulation of carbohydrates or tannic substances due to disturbed metabolism. The violet straw contained 5.8 per cent protein and 1.6 per cent of fat as compared with 3.1 and 1.3 per cent, respectively, in the ripe yellow straw.

The sugar beet in 1911, E. SAILLARD (*Jour. Agr. Prat., n. ser.*, 22 (1911), No. 44, pp. 562-564).—Tables state the chemical composition of sugar beets during each year of the period 1907-1911.

The 1911 crops contained more amid, ammoniacal, and injurious nitrogen than those of preceding years, and the alkalinity during evaporation was less pronounced. Analyses during 1907-1910 indicate that when the ratio of nitrogen to sugar is highest, that of albuminoid nitrogen to total nitrogen is lowest.

Biometrical studies of tobacco varieties, G. RINALDI (*Bol. Tec. Colliv. Tabacchi [Scafati]*, 10 (1911), No. 6, pp. 331-366).—Tables state in full the data gathered in studies comparing some of the principal tobacco varieties throughout the vegetation period. The amount of water required for germination, the amounts retained in the different organs of the plant, and the amounts contained in the plants at different periods of growth are also reported.

The weight of topped plants was greater than that of the untopped plants of the Kentucky, Havana, and Brazil varieties, and was about equal in Herzegovina or Sumatra plants, but in case of Erbasanta and Chinensis, which represented *Nicotiana rustica*, the plants with ripe seed excelled in weight. The author found that Erbasanta and Chinensis had at first a higher dry matter percentage than plants of the 5 varieties of *N. tabacum* studied, but during later vegetation periods they stood below the Havana and Sumatra varieties in this respect.

The early fertilization of tobacco seedlings and their later development, L. MONTEMARTINI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 10, pp. 794-796).—These pages state the results obtained by sowing tobacco seed in April in sand-filled earthen vessels. Different artificial fertilizers were added to the 5 pots in the test and the plants were transplanted late in May. They were set in 2 beds, one of which was well fertilized and exposed to the sun, while the other was shaded and rather sterile.

At the time of transplanting the plants, those that had received Wagner salts seemed best developed, while those that had received a mixture of nitrate of potash and nitrate of ammonia came next, followed by those that had received potassium phosphate. The plants that had been given only nitrate of ammonia lived but a short time after transplanting. Those that had received calcium phosphate appeared weak when transplanted but by August they excelled the others of both beds in height and in size of leaf. The author regards these results as substantiating his earlier conclusions on the value of calcium phosphate as a fertilizer for solanaceous plants when they are making their first growth.

Field experiments with wheat, F. DITZELL (*Agr. Gaz. N. S. Wales*, 28 (1912), No. 2, pp. 122-136).—These pages report rotation, fertilizer, cultural, and method of seeding tests with wheat at the Cowra experiment farm of the department of agriculture of New South Wales.

The effect of carbon bisulphid on the germination of wheat, A. MORETTINI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 5-6, pp. 417-422).—Experiments on 2 varieties of wheat indicated that the use of carbon bisulphid at the rate of 35 gm. per hectoliter did not injure the germinating power unless its action was concentrated on one part of the heap, as when it was poured directly on the grain.

Plant breeding methods, A. HUMMEL (*Fühling's Landw. Ztg.*, 60 (1911), No. 22, pp. 761-780, figs. 6).—The author deals with the relative advantages of mass selection, individual selection, and continued individual selection, and reports tests of these methods in 1910-11 at Neustettin where he worked on the time of flowering of rape and turnips.

Mass selection changed the time of flowering about 1 day, and a combination of individual and mass selection advanced the time of blooming from 1 to 3 days. Tables and curves state in detail the results obtained.

[Seed tests], S. HAMMAR (*Ber. Verks. Skara Kem. Stat. Frökontrollanst.*, 1911, pp. 19-26).—Tables state the results of purity tests and mechanical analyses of seeds of small grains, legumes, and grasses.

Studies with dodder.—I, The germinability of the seeds. II, Infection studies, A. VON DEGEN (*Landw. Vers. Stat.*, 77 (1912), No. 1-2, pp. 67-128, figs. 6).—The author studied in the first series of experiments the germination of the seeds of *Cuscuta trifolii* and *C. suaveolens* as regards time of sprouting under favorable conditions, and in the second the ability of the seeds of *C. suaveolens* to endanger crops by producing plants under the conditions existing in the open fields. The more significant results are as follows:

The germinability of *C. suaveolens* is higher than that of *C. trifolii*, the two being in the experiments made 67.6 and 47 per cent, respectively, of the seeds tested. Both these dodders show a protracted energy of germinability. The greatest percentage of germination occurred in the month of seeding, but thereafter there was a steady decrease to mere sporadic appearances during the 27 or 28 months of observation, and at the end of this time there remained, having neither sprouted nor rotted, 12.5 per cent of the seed of the first and 6 per cent of that of the second species. This delayed germination constitutes a continuous source of danger from these parasitic vines. It is, however, decreased by the fact that germination is retarded by the shading due to luxuriance of the host crops, and is lessened by deep planting, while shallow seeding and the more abundant light after harvest tend to sprout the seeds at such times.

The results obtained in the second series led to the conclusion that clover seed containing not more than 3 seeds of dodder per kilogram is entirely safe for planting, as very few of the parasitic plants may be expected to develop

from such seed. Planting at from 2½ to 4 cm. in depth below the surface is considered sufficient protection in case of clover seeds containing as high as 10 seeds of dodder per kilogram. This species of dodder is a southern plant and is sensitive to low temperatures.

Michigan weeds. W. J. BEAL (*Michigan Sta. Bul.* 267, pp. 277-453, pl. 1, figs. 248).—This bulletin is a companion to Bulletin 260, already noted (*E. S. R.*, 23, p. 439). It describes briefly and illustrates the more important weeds of Michigan, and is intended to aid students and farmers in recognizing some of them. Methods of eradication are briefly discussed.

HORTICULTURE.

[Horticultural work at the Canadian experiment stations and farms in 1910], W. SAUNDERS, W. T. MACOUN, F. T. SHUTT, ET AL. (*Canada Expt. Farms Rpts.* 1911, pp. 25-28, 101-122, 128-130, 133-135, 198-200, 307-313, 337-340, 388-394, 414-424, 474-476, 502-505, 506, 507, 519-524, 525-530, pls. 3).—This is the customary report on the breeding and cultural experiments with fruits, vegetables, forest and ornamental trees, and herbaceous plants being conducted at the Central Farm, Ottawa, and at the various branch experiment stations and farms in Canada (*E. S. R.*, 24, p. 440).

A number of seedling apples received at the Central Farm for examination are described and descriptions are also given of 13 additional seedling apples originated on the farm. Thus far a total of 720 trees from seeds sown in 1898 and later have fruited. Descriptions of these fruits, whatever their character, have been made and a large amount of data has been thus accumulated. Certain characteristics of 581 seedlings of 11 varieties are presented in tabular form and compared. There appears to be considerable variation between seedlings from the same female parent, the male parentage of the seedlings not being definitely known.

To throw some light on the fruit-yielding possibilities of different varieties of apples, a table is given showing the yields of the best yielding tree of a number of varieties from the third to the twenty-second year after planting. To illustrate the individuality of the trees, yields for the period 1899 to 1910 are also given of a number of individuals of the same variety of apples. Trees grown practically under the same conditions have shown a wide variation in yield.

One of the most promising seedling plums fruiting during the year was the Dara, which is here described. The downy leaved cherry (*Prunus tomentosa*), a bush cherry, is found to be hardier than the tree cherries and promises to be a very useful fruit for the colder parts of Canada. The King red raspberry is proving to be one of the hardiest varieties in the prairie Provinces.

A list is given of the varieties of vegetables which have proven to be most successful in the farm tests. The work of selecting tomato seed to develop superior early strains was continued. The results, as here tabulated, show that all of the selections have progressed in the direction in which the selection was made. In the selection for large early production, the yield has increased each year and the tomatoes selected for earliness have ripened earlier than those selected for productiveness and uniformity without regard to earliness. Improvement in uniformity has not yet been marked.

In the forest belts on the Central Farm, the trees which were planted 5 by 5 ft. apart in plats of single species are in most cases making the best trees from a timber standpoint since the side branches are soon killed out. It is suggested that this distance might be reduced with advantage to 4 by 4 ft. Growth measurements for the period 1907 to 1910 are given for a number of trees planted in various soils and at different distances.

The work at the branch stations and farms consisted largely of variety tests. Analyses of lime-sulphur washes and arsenate of lead are also reported.

Beginners' guide to fruit growing, F. A. WAUGH (*New York and London, 1912, pp. 120, pl. 1, figs. 62*).—This work is offered as a simple statement of the elementary practices of propagation, planting, culture, fertilization, pruning, spraying, etc. It also includes chapters on varieties of fruit for different sections and orchard renovation.

Horticultural statutes of the State of California, 1912 (*Sacramento: State Com. Hort., 1912, pp. 146*).—This comprises the horticultural statutes with court decisions and legal opinions relating thereto, also state quarantine and county ordinances relating to horticulture, and a list of state and county horticultural officers corrected to February 1, 1912.

Combating orchard and garden enemies, W. H. CHANDLER (*Missouri Sta. Bul. 102, pp. 239-299, figs. 37*).—The more important insect pests and fungus diseases of fruits and vegetables are briefly described, and directions are given for their control as well as for the preparation of fungicides and insecticides and for protecting trees against rabbits and mice.

Ampelography of the Crimea, S. KOBSHINSKY (*Trudy Biuro Prikl. Bot. (Bul. Angew. Bot.), 3 (1910), No. 9-10, pp. 323-478; 4 (1911), Nos. 8-9, pp. 267-458; 10, pp. 465-540, pls. 64, figs. 102*).—A descriptive account of the cultivated varieties of grapes in the Crimea, based on studies conducted in the period 1898 to 1900. A number of self- and cross-pollination experiments conducted with 23 Crimean grape varieties are also described.

The text is accompanied by a number of illustrations showing the character of the fruit and foliage of different species.

Statistics on the production of grapes and olives in 1911 (*Estadística de las Producciones Vitícola y Olivarrera en el Año 1911. Madrid: Govt., 1912, pp. 9*).—A statistical review of the production of grapes, wine, olives, and olive oil in the regions and Provinces of Spain for the year 1911.

Citrus experiments, A. W. BLAIR (*Florida Sta. Rpt. 1911, pp. XXVII-XXXI, figs. 6*).—This comprises a progress report on the fertilizer experiments with citrus fruits previously noted (*E. S. R., 25, p. 427*). Measurements have been made of the trees on each plat 3 times a year and tabular data are given showing the average gain in diameter of the trees on each plat from June 7, 1909, to June 21, 1911.

The experiment thus far does not indicate any marked growth increase in favor of any particular fertilizer used. The clean culture plats on the whole are slightly above the general average in appearance, and some of the trees in the plat which has received no fertilizer are beginning to indicate by a yellowing of the leaves a need of nitrogen. Considerable die-back was observed in the grove in 1910, but no relationship was found between the fertilizers used and the presence or absence of die-back.

A practical method of artificially ripening Japanese persimmons, F. E. LLOYD (*Proc. Ala. State Hort. Soc., 9 (1912), pp. 57-63*).—The author reviews Gore's experiments in ripening persimmons with carbon dioxide (*E. S. R., 25, p. 744*), and summarizes the results secured in his own work at the Alabama College Station during 1911 (*E. S. R., 26, p. 327*).

Large scale experiments on the processing of Japanese persimmons; with notes on the preparation of dried persimmons, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Bul. 155, pp. 20, figs. 3*).—In previous experiments conducted co-operatively by the Bureaus of Chemistry and Plant Industry (*E. S. R., 25, p. 744*) it was found that upon keeping unripe persimmons for several days in an inert gas, such as carbon dioxide, they become nonastringent while remaining firm. During the season 1911 these experiments with carbon dioxide were

extended to a semicommercial scale in order to determine the value of the method when applied to the commonly grown varieties of Japanese persimmons. The method used in this work is described in detail and an account is given of experiments in the application of the method to persimmons in Florida and at Washington, D. C. A laboratory method of drying persimmons which has given an excellent product in appearance and flavor is also described.

All of the varieties processed became nonastringent when kept in carbon dioxide, the time required for processing ranging from 1½ to 7 days, depending on the variety. The varieties processed in Florida were subjected to a shipping test. With one exception (the yellow-fleshed Zengi) processing greatly injured the naturally excellent shipping qualities of the fruit, but the Tane-nashi variety was less seriously affected than many of the others.

Contrary to the results noted in the previous experiments, no undesirable effects were produced by high humidity while in process. Processing required a longer time in Washington than in Florida, presumably on account of the lower temperatures. It was found that the softening of the fruit after processing can be considerably retarded by keeping at refrigerator or cold storage temperatures.

The results as a whole indicate that the carbon dioxide ripening process can be recommended generally for treating persimmons for local distribution. Processing may also be successfully employed after shipment.

Covering almond trees for frost protection, A. G. McADIE (*Mo. Weather Rev.*, 40 (1912), No. 2, pp. 282, 283, figs. 2).—Some experiments in covering almond trees with paper at the university farm, Davis, Cal., during February and March, 1912, are reported and discussed.

The paper used was a weatherproof manila and was first put on at 5 p. m. February 19, and removed at 9 a. m. February 21. It was again put on at 5 p. m. February 25, and removed at 8 a. m. February 26, then again put on at 6 p. m. on February 26 and left on until 8 a. m. March 1. Temperatures were taken both under the cover and outside.

A minimum temperature of 19° F. occurred a little after 8 a. m. on February 26, whereas under the cover the temperature fell to 24°. In general the temperature curves were quite similar, the temperature under the cover being higher in every case. The loss of heat, however, while retarded by the cover, was not sufficiently decreased to warrant extensive use of the method in its present form. Likewise, while there was a difference between the inside and outside rates of warming after sunrise, the rate of warming under the cover was still too rapid. It is suggested that a more effective barrier to insolation can be made by using a double cover with an intervening air space.

Although the almonds were lost the author infers from the experiment that with proper care and improved methods fruits can be protected from the strains incident to rapid loss of temperature and rapid heating, within moderate limits.

Cranberry bog management for Wisconsin, O. G. MALDE (*Wisconsin Sta. Bul.* 219, pp. 3-25, figs. 13).—In a previous bulletin of the station the principles and methods of establishing cranberry bogs were described (E. S. R., 20, p. 841). The present bulletin considers the management of a cranberry bog from the time of planting up to the time of harvesting. The subject matter is discussed under the following general headings: Care of new planting, care of bearing cranberry vines, destroying the weeds, fertilizers for cranberries, protecting bogs from frosts, protection from insects, reclaiming old cranberry bogs, and marketing vines for planting.

Tabular data, based on a circular letter sent out in 1910, showing the average acreage, cost of handling, yield, and profits on Wisconsin cranberry bogs,

are given. The net earnings on clean, sanded bogs were 5 times as great as on semiwild bogs, the increase in yield 4 times as great, and there was a great decrease in the cost of harvesting.

Ginseng and golden seal growers' handbook, J. H. KOEHLER (*Wausau, Wis.*, 1912, pp. VII+116, pls. 41).—A popular handbook of information relative to the history, uses, market, commercial value, culture, diseases, and insects of ginseng, with briefer reference to the golden seal. The subject matter is based upon the author's experience as a grower as well as on the investigational literature on the subject.

Status and prospects in ginseng industry, M. G. KAINS (*Amer. Agr.*, 89 (1912), No. 24, p. 755).—A note on the present status of ginseng culture in the United States.

Lavender cultivation, J. KNIGHT (*Jour. Dept. Agr. Victoria*, 10 (1912), No. 5, pp. 316-321, figs. 5).—A popular account of lavender culture and the oil extraction in Victoria.

A practical handbook of trees, shrubs, vines, and herbaceous perennials, J. KIRKEGAARD (*Boston*, 1912, pp. 407, pls. 60, figs. 3).—The larger part of this work, which is offered primarily as a reference book of hardy ornamental trees and plants, is given up to a tabular description and classification of species, including notes on their important characteristics, uses, and treatment. In addition to the descriptions many of the uncommon or partially known species and varieties are illustrated. Other features of the work include planting lists and plans, general information relative to planting operations, and notes on rose culture and lawn making, together with lists of trees and plants for special purposes.

An article by H. T. Fernald on *The Insect Pests of Shade Trees and Shrubs* is also included.

Lawn soils and lawns, O. SCHREINER, J. J. SKINNER, L. C. CORBETT, and F. L. MULFORD (*U. S. Dept. Agr., Farmers' Bul.* 494, pp. 48, figs. 19).—This comprises an adaptation with revisions of the subject matter in *Farmers' Bulletin* 248 (*E. S. R.*, 17, p. 976) and *Bureau of Soils Bulletin* 75 (*E. S. R.*, 24, p. 712).

FORESTRY.

Forest conditions in the northern Ozarks of Arkansas, W. W. BENNETT (*Forest Club Ann. [Univ. Nebr.]*, 4 (1912), pp. 61-67).—A descriptive account of forest types occurring in the northern Ozarks.

Notes on forest conditions in northwestern Nebraska, R. J. POOL (*Forest Club Ann. [Univ. Nebr.]*, 4 (1912), pp. 51-60, pls. 3).—A descriptive account of forest types occurring in northwestern Nebraska.

Trees of Omaha, S. V. FULLAWAY, Jr., and W. R. CHAPLINE, Jr. (*Forest Club Ann. [Univ. Nebr.]*, 4 (1912), pp. 24-38).—A contribution to the knowledge of the native and exotic trees of Nebraska, consisting of a list of 171 species, of which 38 are native to the State. The scientific and common name, the maximum diameter and height, and the native habitat of each species are given.

The catalpas and their allies, H. GARMAN (*Kentucky Sta. Bul.* 164, pp. 203-223, pls. 9, figs. 8).—The author calls attention to the characteristics distinguishing the western catalpa (*Catalpa speciosa*) from the southern catalpa (*C. bignonioides*). Consideration is also given to the importance of the western catalpa as a wood for fence posts and railway ties, propagating and growing the trees, rate of growth, characteristics of the wood, and enemies of the catalpa. Brief descriptive notes are also given of some related species, including the trumpet creeper (*Tecoma radicans*), the cross vine (*Bignonia*

coproliata), and the Japanese catalpa (*C. kämpferi*), together with an account of the trumpet creeper leaf miner (*Octotoma plicatula*) and its control.

Utah juniper in central Arizona, F. J. PHILLIPS and W. MULFORD (*U. S. Dept. Agr., Forest Serv. Circ. 197*, pp. 19, pls. 2, fig. 1).—The Utah juniper (*Juniperus utahensis*), which is considered the most important tree of the woodland forest of central Arizona, is here discussed relative to its distribution, climatic requirements, botanical characteristics, silvical characteristics, growth, volume, yield, utilization, and management.

Quebracho wood and its substitutes, C. D. MELL and W. D. BAUSH (*U. S. Dept. Agr., Forest Serv. Circ. 202*, pp. 12, pls. 2, fig. 1).—This circular discusses the uses and distinguishing characteristics of the quebracho (*Quebrachia lorentzii*), a South American wood yielding a valuable tanning extract, and of the principal woods substituted for the quebracho, and presents a key for their identification.

Cinchona in Java from 1872 to 1907, being extracts translated from the *Scheikundige Bijdragen tot de Kennis der Java-kina, 1872 to 1907*, K. W. VAN GORCOM, edited by D. HOOPER (*Agr. Ledger, 1911*, No. 4 (*Veg. Prod. Ser. No. 115*), pp. 35-106).—An English translation of the author's pamphlet, abridged and rearranged with special reference to its application to the cinchona industry in India. It comprises a historical account of the botanical, cultural, and chemical investigations which have been conducted in connection with the cinchona industry in Java.

Castilla and its culture, P. OLSSON-SEFFER (*Dept. Landb. Suriname Bul. 27, 1912*, pp. 66, pls. 7).—The late author's English manuscript on the culture and preparation of Mexican rubber is here translated into the Dutch language by J. Kuijper, and a summarized account of Castilla rubber in Surinam is appended, in which Castilla rubber is considered relative to its botany, distribution, species and varieties, cultural details, tapping, preparation of the rubber, and marketing.

A test of daily versus alternate daily tapping of Hevea, C. J. J. VAN HALL (*Teysmannia, 23* (1912), No. 2, pp. 92-99).—Two lots of 300 trees each were tapped from March 15 to December 14. In the first period lot A was tapped daily and lot B every other day. The tapping was reversed in the second period, resumed in the third period, and again reversed in the fourth period.

The data as here tabulated indicate that daily tapping produces a much higher yield of rubber than tapping every other day.

Notes on bark structure, T. KURGER (*Forest Club. Ann. [Univ. Nebr.] 4* (1912), pp. 142-156).—As a result of a preliminary study of bark structure in a large number of American forest trees, the author presents tentative keys showing the more prominent bark characteristics of each genus as indicated by the limited number of species studied.

A sample dichotomous table for determination of coniferous species, L. PARBÉ (*Rev. Eaux et Forêts, 51* (1912), No. 11, pp. 340, 341).—The author presents a specimen dichotomous key for the purpose of soliciting criticism and suggestions as to improvement.

The equipment and operation of a Prussian seed extracting establishment, A. B. RECKNAGEL (*Forestry Quart., 10* (1912), No. 2, pp. 229-234, figs. 2).—A descriptive account, based on a personal inspection of a Prussian seed extracting establishment and offered as supplementary to a previous article by Wiebecke on the same subject (*E. S. R., 23*, p. 445).

The economic returns from forestry, with special reference to the Prussian state forests, MARTIN (*Tharand. Forstl. Jahrb., 63* (1912), Nos. 1, pp. 40-58; 2, pp. 78-142).—A critical study of the construction and application of yield

tables, with special reference to the spruce, pine, and beech, based on an examination of tables prepared by various authorities. The study is discussed under the following general headings: Contents of yield tables, the conception of normal stand, application of yield tables, and the future returns from yield investigations.

Assistance to private owners in the practice of forestry (*U. S. Dept. Agr., Forest Serv. Circ. 203*, pp. 8).—This circular supersedes Circular 165 (*E. S. R.*, 21, p. 444). It discusses the aims and nature of assistance given and contains the regulations governing cooperation with private owners, together with sample application forms.

Some permanent sample plat studies, C. F. KOESTIAN (*Forest Club Ann. [Univ. Nebr.]*, 4 (1912), pp. 115-127, pls. 2).—The author describes in detail some permanent sample forest plat studies which are being conducted by the Forest Service of the U. S. Department of Agriculture in the Sierras.

A method for determining the effects of forests upon run-off in the Rockies, R. D. GARVER (*Forest Club Ann. [Univ. Nebr.]*, 4 (1912), pp. 68-73).—The author outlines a plan for the determination of the effects of forests upon streams.

The effect of forest fires on trees and reproduction in southern New England, P. L. BUTTRICK (*Forestry Quart.*, 10 (1912), No. 2, pp. 195-207, fig. 1).—This paper discusses the factors influencing the resistance of trees to fire, the after effects of a single fire, the effect of recurring fires, fire in relation to sprouting, the effect of forest fires on reproduction, and the effect of age on resistance.

The need of fire protection in the Tropics, C. E. C. FISCHER (*Indian Forester*, 38 (1912), No. 5, pp. 191-221).—A review of the literature on this subject.

Rainfall a factor of tree increment, F. DAVIS (*Forestry Quart.*, 10 (1912), No. 2, pp. 222-228, fig. 1).—Finding that the work of several European investigators appeared to show a correlation between tree increment and the amount of annual rainfall, the author studied tree specimens, principally from New England and the Eastern States, in conjunction with the monthly rainfall records. The results as here tabulated and discussed indicate that rainfall is a great factor in tree increment.

Notes on winterkilling of forest trees, C. P. HASTLEY (*Forest Club Ann. [Univ. Nebr.]*, 4 (1912), pp. 39-50).—This comprises notes on the occurrence and nature of winter injury to forest trees as observed in district 2 of the Forest Service of the U. S. Department of Agriculture, including Colorado, Kansas, Nebraska, part of South Dakota, and Wyoming.

A new method of constructing volume tables, D. BRUCE (*Forestry Quart.*, 10 (1912), No. 2, pp. 215-221).—The author describes a method of constructing volume tables which involves the use of what is termed the "frustum" form factor.

Sand blast tests of New South Wales timbers, W. H. WARREN (*Jour. and Proc. Roy. Soc. N. S. Wales*, 44 (1910), pt. 4, pp. 620-630, pls. 5, figs. 4).—The tests here described were conducted in order to obtain the relative values of timbers for wood paving, flooring, and similar purposes.

On the durability of railroad ties, K. HAVELÍK (*Centbl. Gesam. Forstw.*, 33 (1912), Nos. 3, pp. 105-115; 4, pp. 172-182; 5, pp. 224-233, figs. 5).—This is a review of recent investigations along this line, with conclusions based on a study of the results as a whole.

Quantity and quality of creosote found in two treated piles after long service, E. BATEMAN (*U. S. Dept. Agr., Forest Serv. Circ. 199*, pp. 8, pl. 1, fig. 1).—This circular gives the results of analyses of creosote found in 2

treated piles which had been in the teredo-infested waters of the Gulf of Mexico for about 30 years.

One of the piles was perfectly sound, whereas the other had been attacked, particularly at the water line. No treating records were available. The analyses showed that the creosote in the perfectly preserved pile originally contained at least 40 per cent of naphthalene fractions, a large portion of which remained in the wood. The creosote in the less perfectly preserved pile contained little or no naphthalene.

DISEASES OF PLANTS.

[Report of the botanist on plant diseases in 1910], H. T. Güssow (*Canada Dept. Farms Rpts. 1911, pp. 239, 240, 244-260, pls. 4*).—During the year many diseases have been dealt with, among them rust of grains, mildew of wheat, bitter pit, anthracnose, black rot, bitter rot, rust, and sooty mold of apples, a bacterial blight of English walnut observed at Agassiz, B. C., diseases of plums, cherries, and small fruits, onion mildew, leaf spot of tomatoes, club root of crucifers, also the following which are given especial notice:

A frost injury to wheat is reported to occur on frosty nights on unevenly ripened grain lying freshly cut. The grains shrivel, becoming lighter in weight and darker in color than sound ones, and their germination is found to be lower and more uneven as to time, thus perpetuating the trouble.

A discoloration of the grains in wheat from several widely separated regions is described. The embryo is darkened, and the plant seems to lack vigor. Further investigations in this connection are contemplated.

A peculiar belting of pears with a band of russet corky cells was studied, and is attributed to chilling when young, these parts having been found to lack the coat of fine hairs claimed to give a measure of protection when present.

A new contagious disease of peaches has been observed in the Niagara district, extending into New York State. It manifests itself by cankers on trees of all ages and varieties, attacking and weakening any part so that large branches may be lost through breaking. The disease spreads rapidly, and has quickly become very serious.

Strawberries and raspberries are said to suffer injury during cold nights when in bloom, the frost killing some of the styles and thus causing the fruit to be malformed when matured. Protection by means of hedges or cheese cloth and by smudge fires, also spraying with cold water in early mornings, have been found useful as preventives of this injury.

Potato scab experiments having previously led to results apparently inconsistent, a series of annual tests was entered upon to determine the relative value of the treatments usually prescribed. The crops obtained by planting uniformly but not badly scabbed seed potatoes showed 54.8 per cent of scabby tubers from the untreated seed, 34.5 per cent from the carbonate of soda treatment (10 oz. in 10 gal. water), 53.3 per cent from the corrosive sublimate (1:2,000), and 38.4 per cent from the formalin solution (1 lb. in 30 gal. water). No conclusions are drawn.

Internal spotting of potatoes externally sound, caused by discoloration of the vascular bundles near the stem end, is reported. The trouble appears to be identical with that known as "sprain" in England and as "Eisenfleckigkeit" in Germany. Observers are not unanimous as to its cause. See also another note (E. S. R., 21, p. 447).

Leaf spot of elm (*Dothidella ulmea*) was found to extend back upon the petioles to the tips of the young shoots. These twist downward and are finally

killed, none recovering so far as observed. Removal and burning of all such parts in autumn is recommended.

Other parasitic fungi the occurrence of which is recorded are *Entomosporium mespili* on English hawthorn from Nova Scotia, *Lophodermium nervisequum* on *Abies* sp. from New Brunswick, and *Dasyscypha willkommii* from Nova Scotia.

Report of plant pathologist, H. S. FAWCETT (*Florida Sta. Rpt. 1911, pp. LVIII-LXVII, figs. 3*).—This report summarizes investigations carried on during the fiscal year, the principal studies being made on diseases of citrus trees and in part previously noted (E. S. R., 25, p. 456; 26, p. 449). A number of experiments to control stem-end rot were conducted, but none of the treatments gave beneficial results.

Diplodia natalensis has been found to cause gummosis of peach and orange trees. In addition to these host plants, inoculation experiments have been made with the cultures of the organism, on 18 species of native trees. The following 6 species produced gum with the killing of tissue: Wild plum, wild cherry, cherry laurel, prickly ash, sweet gum, and sumac. Four additional species showed bleeding with killing of tissue, but no gum. These were basswood, red bud, hackberry, and mulberry. Iron wood and water oak showed slight killing of tissue without any bleeding, while hawthorn, hickory, magnolia, holly, ash, and huckleberry were apparently not affected by inoculation with the fungus.

Brief notes are given on black rot due to *Alternaria citri*, blue mold rot caused by *Penicillium italicum* and *P. digitatum*, scab or verrucosis due to *Cladosporium citri*, and on the brown fungus of the white fly (*Aceria webberi*).

Report of plant physiologist, B. F. FLOYD (*Florida Sta. Rpt. 1911, pp. LXVIII-LXXXI, figs. 5*).—The principal work in the laboratory of plant physiology has consisted of a study of the nutrition and malnutrition of citrus plants, attention being given to some of the diseases that are supposed to be due to malnutrition. Among these are die-back, melanose, yellow spotting, and frenching.

Experiments are in progress with organic nitrogenous fertilizers to determine their effect, especially on die-back and melanose, and in conjunction with these experiments studies are being made on the maximum fertilization of citrus trees, particularly the nitrogen fertilization. Heavy fertilizing has been found to cause disturbances in the nutrition of citrus trees, resulting in the falling of the leaves and fruit, but experiments thus far indicate that the chemical injury shows itself only in the weaker parts of the plants.

Experiments on die-back have been begun in the citrus experimental grove near Tavares to determine the effect of certain fertilizers on the chemical and physical properties of the soil, upon the trees, and upon the quality and quantity of the fruit, and also to study the relation of the fertilizers to insect pests and diseases. The die-back, so far as the plot experiments have gone, seems to be independent of the fertilizers that have been used.

An extended report is given of the investigations on melanose, a disease of citrus trees which is distributed throughout Florida and is also known to occur in a number of other regions. In Australia the disease is claimed to be due to the fungus *Cladosporium brunneo-atrum* (E. S. R., 12, p. 635), but American investigators have never been able to isolate any fungus in cultures made from diseased material. Melanose seems to affect all varieties of citrus trees in Florida, the greatest injury being done to the fruit. The gross and microscopic characters of the disease are described, and the author concludes that it is probable that melanose is not caused by unfavorable growth factors.

but that it is a disease due to some unknown organism. If this organism is a fungus, it is thought that it probably exists only in a vegetative condition, and that its hyphae are very diminutive, making it difficult to distinguish in the host tissue.

Notes on some mildews, E. FÖRER (*Ann. École Nat. Agr. Montpellier, n. ser., 11 (1912), Nos. 3, pp. 246-248, fig. 1; 4, pp. 249-264, pl. 1, figs. 5*).—Notes are given on the formation of conidiophores of species of Erysiphaceae; on the presence of two kinds of conidiophores in *Oidiopsis taurica*, a parasite of sainfoin; and on *Oidium alphitoides*, the mildew that has been so abundant in Europe on the oaks within the past few years.

The specialization of *Uromyces caryophyllinus*, E. FISCHER (*Mycol. Centbl., 1 (1912), No. 1, pp. 1, 2*).—In continuance of previous work (E. S. R., 24, p. 346), the present brief preliminary report states that the author tested the supposition that this fungus falls into several species living on different hosts. It is claimed that in repeated tests this fungus was successfully cultivated on *Tunica prolifera* but not on *Saponaria ocymoides*, and the conclusion is reached that here are two forms biologically distinct.

Corrosive sublimate as treatment for winter grains, L. HILTNER and GENTNER (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 9 (1911), No. 9-10, pp. 117, 118*).—In pursuance of studies by the senior author on corrosive sublimate as protection from attacks of *Fusarium*, resulting from infected seed (E. S. R., 25, pp. 548, 652), observations were made on the crop of 1911.

It is stated that the percentage of attack was found not less than in the previous year, notwithstanding it is probable that more sublimate was used in 1911, but the authors claim that the degree of infection was lower. The reports show that in case of early sowings of rye a better stand of plants was obtained from the seed that had been first soaked in the sublimate solution. A later report on this subject is promised.

A wheat head disease, G. FROM (*Jour. Agr. Prat., n. ser., 23 (1912), No. 11, pp. 340-342, figs. 2*).—Illustrations and a brief description are given of a disease of wheat in France said to have been known there for about 30 years, but now becoming serious in some sections. The disease attacks the head. In some cases, only the middle portion is affected, but in severer cases the whole head is deformed and dwarfed, the chaff being flecked with black spots or covered with a dark mycelium which prevents development of all grains except possibly those at the ends of the spike. The affection is ascribed to the fungus *Dilophia graminis*. The author urges further studies of the disease.

Leaf roll of potato (*Ztschr. Landw. Versuchs. Österr., 14 (1911), No. 7, pp. 911-915, pl. 1, fig. 1*).—This is the third report of the committee appointed for the study of this disease. The symptoms are fully described in order to prevent confusion between this and somewhat similar affections. Such means of combating the disease as chemical treatment of seed tubers, disinfection of the soil, and use of special fertilizers, are stated to have been found thus far of negative or at best of doubtful utility. Early removal from the field of tubers from diseased plants and careful culling of seed tubers are recommended as practical measures that are in a degree protective.

The wart disease of potatoes, T. H. MIDDLETON (*Bd. Agr. and Fisheries [London], Ann. Rpt. Intel. Div. 1910-11, pt. 2, pp. 33-54, maps 2*).—The wart disease of potatoes, due to *Synchytrium endobioticum*, is present over a large area covering the west and northwest of England, parts of Wales, and a part of Scotland.

Experiments with about 50 different varieties were carried on in 1910 in different localities to determine their resistance to the disease, with gratifying results. The varieties Langworthy, Conquest, and Golden Wonder were not

at all or only slightly attacked by disease, although the potatoes were planted in soils in which susceptible varieties would not have produced a sound plant. Other varieties contained a certain amount of disease, and the majority were either entirely destroyed or produced very few sound tubers.

Another series of experiments is reported upon in which different soil treatments were tested for the control of the disease, the fungicides used being sulphur, copper sulphate, iron sulphate, Strawsonite, potassium sulphid, etc. In no single plat did the potatoes escape disease, and the number of plants affected was so great that it was not considered worth while to attempt to determine the proportion of affected tubers.

Another experiment was carried on to determine the value of the process of greening the seed potatoes in relation to the disease. It was found that sprouted tubers when planted in soils infected by the fungus were more liable to produce a smaller crop of tubers and were more subject to disease than unsprouted tubers.

Some fungus diseases of the prickly pear, F. A. WOLF (*Ann. Mycol.*, 19 (1912), No. 2, pp. 113-134, figs. 8).—The author has during the past 3 years made a study of the common diseases of the prickly pear (*Opuntia lindheimeri*), which is used to some extent in south and southwest Texas as a forage crop. The present report considers the structure, cultural characteristics, and life history of the fungi themselves, also the symptomology and the pathological morphology of the prickly pear.

The fungi most common are stated to be *Sphaerella opuntiae*, causing in its conidial stage (called *Glaeosporium lunatum*) an anthracnose; *Perisporium wrightii*, causing the black spot disease; and *Hendersonia opuntiae*, causing the sun scald of prickly pear. Several other disease-causing fungi of less destructive nature are mentioned.

Infection with *S. opuntiae* takes place only following the rainy season in the spring, causing a serious rotting of the new and tender joints. *P. wrightii* is the least common and causes the least injury of these three. *H. opuntiae* is very abundant and destructive. Segments of all ages are affected. The mycelium spreads within the epidermal system, closing the stomata and developing its pycnidia from these stomatal plugs. The scalded appearance is due to the development of suberized tissue as protection from desiccation.

Beet nematodes (*Heterodera schachtii*), O. FUCHS (*Ztschr. Landw. Versuchs. Österr.*, 14 (1911), No. 7, pp. 923-952).—An account is given of the author's studies on the biology and control of eelworms which attack beets and several other plants. These are said to be migratory and to be carried far and wide in wet weather by moving water, circumstances which increase the difficulties of combating their ravages. The Kühn method of trap-plants is favored but is said to be subject to the drawback that the larvæ remain in the soil to renew the disease thus temporarily checked. Chemical measures have thus far been found ineffective. The plan of heating the soil to the depth usually occupied by the roots to a temperature of 63° C. is said to prove beneficial, but subject to such drawbacks as expense, difficulty of application, etc. A brief bibliography is given.

Tumor formation in sugar beets, K. SPISAB (*Ztschr. Zuckerrindus. Böhmen*, 36 (1911), Nos. 1, pp. 1-17, figs. 6; 2, pp. 57-72, figs. 5).—This presents the more important results of the author's continuation of previous work (*E. S. R.*, 24, p. 47). The experiments were undertaken with plants in a less advanced stage of development, with a view to testing his assumption, previously stated, that the tumors result from mechanical injury to the roots.

It is claimed that the attempts to produce the tumors by wounding were successful, that these structures develop from wounds in the cambium, and that

the wounded surfaces develop a callous tissue in which may be differentiated the cambium and vascular elements which grow in relation to the corresponding portions of the roots. The tumors require much nutriment, thus hindering the growth of the plant, while these portions, containing little sugar, are either of little or no value or of positive disadvantage to the crop.

Melon or cucumber canker, T. H. MIDDLETON (*Bd. Agr. and Fisheries* [London], *Ann. Rpt. Intel. Div. 1910-11*, pt. 2, pp. 54-56).—The canker of melons and cucumbers, due to *Mycospharella citrullina*, has become quite serious in greenhouses in England, although the disease does not appear to attack outdoor plants to any particular extent. The results of the investigations thus far conducted on the spread of the disease and the means for its control have been very unsatisfactory, and, according to the author, these points require additional investigation. There seems to be evidence that the fungus gains entrance to plants through wounds, and one of the worst cases reported occurred on plants that had been topped. In other cases the infection seemed to follow insect punctures.

It is believed that thorough disinfection of houses in winter and spraying with Bordeaux mixture might prove efficient in controlling the trouble.

Collar blight and other collar and root diseases of the apple, M. B. WAITE (*Rpt. W. Va. Bd. Agr.*, 1912, No. 25, pp. 66-74).—The author discusses a form of pear blight attacking the apple at the thickened portion of the tree just above and below the ground line. For this form of the disease the name collar blight is given. Methods for the control of the disease are described and attention called to some other diseases resembling this trouble in some respects. One of the most common forms of the disease is due to winter injury, which favors the attack of wood rot fungi and hastens the death of the tree.

Brief notes are also given on the crown gall, woolly aphis, and the fungus root rot.

Pear blight control, E. A. GAMMON (*Mo. Bul. Com. Hort. Cal.*, 1 (1912), No. 2, pp. 37-41, figs. 3).—The results of 7 years' active effort in the control of pear blight in a large orchard in California are given. They indicate the necessity of careful pruning and thorough disinfection.

American gooseberry mildew, T. H. MIDDLETON (*Bd. Agr. and Fisheries* [London], *Ann. Rpt. Intel. Div. 1910-11*, pt. 2, pp. 4-27, maps 6).—The present status of the American gooseberry mildew in Great Britain is discussed. The author states that while this disease is prevalent in certain places in which gooseberry growing is carried on as a commercial industry and has caused serious damage in limited areas, it has not yet spread over the whole kingdom or caused great loss. It is claimed that it may be held in check if proper precautions, such as prompt measures in pruning and spraying, be taken by owners of gooseberry bushes.

Attention is called to the apparent periodicity of the disease in some localities, a severe epidemic one year being followed by a year with little of the disease. This is attributed to the fact that the resting spores of the fungus possibly fail to germinate and carry over to a second season.

The rusts of wild grapes in India, E. J. BUTLER (*Ann. Mycol.*, 10 (1912), No. 2, pp. 153-158, fig. 1).—Two species of rusts, said to occur on wild grapes in India, are discussed. One is said to agree closely in description with the previously known *Phacopsora vitis*; the other, claimed to be new, is described under the name *Chrysomyxa vitis*. The first is deemed a very active parasite and a possible source of danger to cultivated vines.

A coconut disease of Mexico, R. OLSSON-SEFFER (*Rev. Trop. Agr.*, 2 (1912), No. 4, pp. 295, 296).—Attention is called to a bud rot disease due to a fungus, said to be *Pythium palmivorum*, which kills the coconut trees in patches of 3

or 4, never on a hillside and always on yellowish clay land. The fungus produces two kinds of spores; one suited to very rapid propagation but short lived, the other capable of surviving for months and infecting distant trees. Cool weather with accompanying rain, fog, and dew favor infection; hence outbreaks occur usually and most freely after such seasons.

The treatment recommended is early destruction of all diseased buds and prompt application of fungicides to points of new infection.

A disease of *Anthemis*, H. BLIN (*Rev. Hort. [Paris]*, 83 (1911), No. 16, pp. 382-384).—A disease of *Anthemis* is reported in France which is said to cause considerable losses to the growers in certain regions.

The foliage first turned yellow, then black; finally the stem was affected and the plant withered and died. The roots were found to be more or less covered with nodules ranging in size from that of a pea to that of a plum, and containing 2 nematodes, *Heterodera schachtii* and *H. radiciicola*. The dead and dying leaves were covered with a fungus, said to be *Alternaria tenuis*, which, however, is thought to be a weak saprophyte.

The precise nature and cause of the disease are not yet definitely determined. As treatments, disinfection of the soil with carbon bisulphid, also resting the soil, considerable spacing between the plants, etc., are recommended for the eelworms. For the fungus, Bordeaux mixture applied to the aerial portions is suggested.

A new *Marssonina* on dill, D. HECYI (*Kísérlet. Közlem.*, 14 (1911), No. 4, pp. 595, 596).—The author describes a disease studied by him on stems, leaves, and flowers of *Anethum graveolens*. He considers it a new species and describes it under the name *M. kirchneri*.

Sweet pea diseases (*Gard. Chron.*, 3. ser., 51 (1912), Nos. 1308, p. 36; 1309, pp. 52, 53; 1311, pp. 84, 85).—The author discusses the disease of sweet peas known as the "streak" disease, due to attacks of *Macrosporium solani*. It is believed that the fungus is carried by seed and that the heavy application of fertilizers used to force sweet peas tends to cause the plants to be more susceptible to attacks of the fungus. The reduction of the large amount of nitrogenous fertilizers, better attention to the preparation of the soil, and the use of sound seed are recommended as means for the prevention of the trouble. Spraying may be resorted to in severe cases, but the foliage sheds the fungicide badly. Treating seed with a potassium permanganate solution is also advised.

The war on the chestnut blight, S. B. DETWILER (*Country Gent.*, 77 (1912), No. 13, pp. 8, 27, fig. 1).—A résumé is given of the papers and discussions at the interstate conference held at Harrisburg, Pa., in February to consider the best methods of dealing with the chestnut bark disease. Delegates were in attendance from Maine, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Ohio, Tennessee, North Carolina, and the Dominion of Canada. Resolutions were adopted recommending prompt and vigorous methods for locating and stamping out the disease in each State so far as practicable. It was also recommended that a quarantine be maintained and that the utilization of diseased chestnut timber be stimulated.

Protection of woods by solutions from injurious fungi, and studies on forms of *Ceratostomella* and *Graphium*, CAROLINE RUMBOLD (*Naturw. Ztschr. Forst u. Landw.*, 9 (1911), No. 10, pp. 429-467, pls. 3; abs. in *Mycol. Centbl.*, 1 (1912), No. 3-4, pp. 115, 116).—In continuance of previous work with wood-injuring fungi (E. S. R., 25, p. 755), the author gives tabulated results of tests of several solutions found to be protective at different strengths. Descriptions are given also of *Ceratostomella* and *Graphium* as affected by different life conditions. Great variations are said to be observable and are pointed to as

presenting difficulties in identification of the species, or in recognition of development stages thereof.

Studies in dry rot.—I. The biology of *Coniophora cerebella*, C. WEHMER (*Mycol. Centbl.*, 1 (1912), No. 1, pp. 2-10, figs. 4).—This important fungus is of very luxuriant growth, especially in quiet, moist air. It attacks wood of several sorts besides conifers, notably the beech (but not oak), and many other materials, as linen, paper, cotton, etc., which serve as a basis for its development. Its physical characteristics, modes of growth, nutrient relations, and descriptions of its spores are given in some detail.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Some common game, aquatic, and rapacious birds in relation to man, W. L. McATEE and F. E. L. BEAL (*U. S. Dept. Agr., Farmers' Bul.* 497, pp. 30, figs. 14).—Attention is called to the fact that water birds, such as grebes, gulls, and terns, are of greater economic value and do less harm than is ordinarily supposed, while some species, like Franklin's gull and the black tern, are markedly beneficial by their destruction of insects. It is also pointed out that many birds of prey are exceedingly valuable to the farmer, although the opposite is true of Cooper's hawk, the sharp-shinned hawk, and the goshawk, all of which should be destroyed as the determined foes of poultry, game birds, and most of the smaller insectivorous species.

Those here dealt with are the prairie chicken (*Tympanuchus americanus*), California quail (*Lophortyx californica*), ruffed grouse (*Bonasa umbellus*), introduced pheasants (*Phasianus torquatus* and *P. colchicus*), upland plover (*Bartramia longicauda*), killdeer (*Oxyechus vociferus*), horned grebe (*Colymbus auritus*), Franklin's gull (*Larus franklini*), terns (*Sterna maxima*, *S. forsteri*, *S. hirundo*, *S. antillarum*, and *Hydrochelidon nigra surinamensis*), Cooper's hawk (*Accipiter cooperi*), rough-legged hawk (*Archibuteo lagopus sanctijohannis*), sparrow hawk (*Falco sparverius*), long-eared owl (*Asio wilsonianus*), and screech owl (*Otus asio*).

"All the shore birds are strikingly beneficial in their food habits, and the slaughter of these game birds deprives the farmer of valuable allies against some of the worst crop pests. . . . The gallinaceous game birds, as quail, grouse, and pheasants, take far less insect food than the shore birds, yet all of them do a certain amount of good. . . . The hawks and owls have a bad name, but for the most part it is undeserved, and indiscriminate persecution of these birds is a serious mistake."

Migration of the Pacific plover to and from the Hawaiian Islands, H. W. HENSHAW (*Auk*, 27 (1910), No. 3, pp. 245-262; *Ann. Rpt. Smithsn. Inst.*, 1910, pp. 545-559).—This paper presents facts relating to the migration of the Pacific plover (*Charadrius dominicus fulvus*), which were gathered in the Hawaiian Islands from 1894 to 1904, together with certain deductions therefrom.

Third annual report of the state ornithologist, E. H. FORBUSH (*Agr. of Mass.*, 58 (1910), pp. 165-197, pl. 1).—Among the subjects considered in this report are the following: Destruction of song birds by aliens; birds feeding on the eggs of the gipsy moth; European methods of attracting birds; and the starling in Europe and America, its food, increase and dissemination, habits of driving certain native birds from their nests, etc.

Digest of the game, fish, and forestry laws, 1911, edited by J. KALBFUS (*Harrisburg, Pa.: State*, 1911, pp. 290).—This digest includes indexes to the laws.

Notes on the mammals of the Lake Maxinkuckee region, B. W. EVERMANN and H. W. CLARK (*Proc. Wash. Acad. Sci.*, 13 (1911), No. 1, pp. 34).—Observations of 31 forms in the region of Lake Maxinkuckee, a glacial lake about 2½ miles long and 1½ miles wide in the southwest corner of Marshall County, Ind., are here reported.

Destruction of rats in Japan (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 82, p. 86).—A bounty of 2½ cts. gold per head offered by the city of Kobe was claimed for 354,291 rats killed during 1911.

Text-book of protozoology, F. DOFLEIN (*Lehrbuch der Protozoenkunde. Jena*, 1911, 3. enl. ed., pp. XII+1043, figs. 951; rev. in *Amer. Nat.*, 46 (1912), No. 545, pp. 308, 309).—A third enlarged edition (*E. S. R.*, 23, p. 357).

Observations upon the morphology of parasitic and cultural amebæ, C. F. CRAIG (*Jour. Med. Research*, 26 (1912), No. 1, pp. 1-37, pls. 2).—The author finds that the organisms here considered, namely, *Entamoeba coli*, *E. histolytica*, *E. tetragena*, and *Ameba lobospinosa* n. sp., differ greatly in morphology and life history, and that each possesses characteristics which entitles it to specific rank.

Report of the dominion entomologist, C. G. HEWITT (*Canada Expt. Farms Rpts.* 1911, pp. 207-235, pls. 3, figs. 3).—This report includes the text and regulations of the destructive insect and pest act of 1910 and accounts of the brown-tail and gipsy moths, fumigation with hydrocyanic acid gas, insects affecting live stock, particularly the warble fly (*Hypoderma lineata*) and ticks (*Dermacentor albipictus*) on horses, thrips (thought to be *Anaphothrips striatus*) attacking cereals, the white-marked tussock moth, and the narcissus fly (*Merodon equestris*). The narcissus fly is now a serious pest in British Columbia, some 50,000 narcissus and daffodil bulbs having been destroyed near Victoria during the year. The author states that he has found the larvæ of this pest present in bulbs imported into Ontario from Holland.

Brief notes on the more important insects reported to the division of entomology during the year are arranged under the headings of insects affecting field and root crops, fruit and fruit trees, forest and shade trees, and garden and greenhouse. The apicultural work of the year is also noted.

The discovery in 1911 of winter webs of the brown-tail moth at Pomeroy Ridge, Charlotte County, New Brunswick, is said to be the first conclusive evidence of the establishment of this pest in New Brunswick.

Report of field entomologist, G. P. WELDON (*Colorado Sta. Rpt.* 1911, pp. 32-34).—In experiments at Rifle both fall and spring applications of lime-sulphur while the trees were dormant controlled the peach twig borer. The tobacco preparations Blackleaf and Blackleaf 40 were also used in the experiments but proved to be of little value in controlling this pest.

Arsenite of zinc is said to have given promising results in the control of the codling moth, in some cases doing better work than arsenate of lead. Experiments indicate that but little can be accomplished in applying a fall spray for the green peach aphid, unless the application be made very late in the season after the eggs have all been deposited.

Trichogramma pretiosa, which was found in abundance the previous year and parasitized as high as 90 per cent of the codling moth eggs, is said to have almost totally disappeared during the season of 1911.

Report of entomologist, E. W. BERGER (*Florida Sta. Rpt.* 1911, pp. XL-LVII).—The author first gives a brief report of the status of fungus diseases of white fly during the year, based on observations at Gainesville, New Smyrna, De-Land, Winter Park, St. Petersburg, the Sub-Peninsula, etc. This is followed by brief accounts of the culture of red *Aschersonia*; germination tests of red and yellow *Aschersonias*; the preservation of fungus in cold storage; soap and

spraying mixtures; weight of white fly pupæ; the woolly white fly; migration of white fly; and scale insects.

Whale-oil soap was found to be a satisfactory agent for use in softening water for use with kerosene emulsion, white fly formula IV, a proprietary emulsion, and a proprietary miscible oil. Some good results were obtained from the use of sodium carbonate in softening water, especially when the mixture of water and soda was allowed to stand for about one-half hour. Borax gave no beneficial results, the oil rising to the surface as readily as when no softening agent had been added.

Applications of lime-sulphur and soda sulphur 1:30 to white fly larvæ in all stages proved ineffective. Tests of the effect of various insecticides on white fly eggs are reported in tabular form. In order to obtain a more adequate idea of the actual drain of the white fly upon the trees, weighings of the nearly mature pupæ were made during March. It is estimated that 1,000,000 pupæ would weigh 67.8 gm. and that this number of larvæ would excrete in a month 15 lbs. of honeydew.

The rufous scale (*Aspidiotus articulatus*) was found to infest a grove near Largo.

Combating scale and other insects, L. TRABUT (*Bul. Agr. Algérie et Tunisie*, 16 (1910), Nos. 7, pp. 149-158; 10, pp. 225-234; 12, pp. 281-293; 16, pp. 377-388; 17, pp. 401-412; 22, pp. 517-528; 17 (1911), Nos. 7, pp. 163-172; 8, pp. 188-202; 9, pp. 224-236; 10, pp. 255-265; 14, pp. 353-360, figs. 127).—This article is devoted largely to the Coccidæ, but also briefly considers thrips, red spiders, and other mites, Aleocharidæ, etc., their parasitic and predaceous enemies, and artificial means of control.

The insect enemies of the prickly pear, H. TAYON (*Queensland Agr. Jour.*, 27 (1911), No. 2, pp. 80-83).—A brief account of the Australian and extra Australian insect enemies of *Opuntia* spp.

Combating the insect enemies of the olive (*Bul. Mens. Off. Renseign. Agr. [Paris]*, 11 (1912), No. 1, pp. 29-38, pl. 1, figs. 3).—This is a report of experiments conducted by the Oleiculture Service in combating the olive fly (*Dacys oleæ*), the olive miner (*Tinea oleæ*), and the olive scale (*Lecanium oleæ*). •

The enemies of the coconut palm (*Bul. Agr. Congo Belge*, 2 (1911), Nos. 3, pp. 512-528, figs. 15; 4, pp. 723-731, figs. 4).—This is a brief account of the insect and other animal enemies and of the diseases of the coconut palm.

Termite studies, N. HOLMGREN (*K. Svenska Vetensk. Akad. Handl.*, 44 (1909), No. 3, pp. 215, pls. 3, figs. 76; 46 (1911), No. 6, pp. 86, pls. 6, figs. 6).—The first part of this work is devoted to the gross and microscopic anatomy and embryology of termites; the second part deals with the classification of the families Mastotermitidæ, Protermitidæ, and Mesotermitidæ.

Grasshopper disease, W. G. SACKETT (*Colorado Sta. Rpt.* 1911, p. 20).—In experiments carried on with a fungus disease, which has appeared sporadically with more or less varying degrees of virulence and has been prevalent among grasshoppers in Colorado, attempts to infect artificially failed. In these experiments grasshoppers were fed with the fungus, a pure culture was spread upon their bodies, and healthy individuals were placed in breeding cages with grasshoppers suffering from or dead of the disease. Pure cultures of the supposed causal fungus have been isolated and attempts have been made to produce on culture media some unusual form of the fungus with which to infect grasshoppers the following season.

On the propagation of the Mexican locust epizootic in Argentina, F. D'HERELLE (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 9, pp. 623-625).—Cultures of *Coccobacillus acridiorum* n. sp., the bacterium that was found to destroy locusts (*Schistocerca gregaria*) in Yucatan, as previously noted

(E. S. R., 26, p. 249), have been used by the author with success in destroying crickets and locusts (*S. paranensis*) in the Province of Santa Fé, Argentina. The epizootic spreads with remarkable rapidity, the disease having been reported from a radius of 50 km. (about 31 miles) about the district first infected within a few days after the first infestation.

It is stated that the Argentine government has decided to employ this means of combating locusts in all the infested territory.

The destruction of locusts by Herelle's method, R. GUÉBIN (*Jour. Agr. Trop.*, 12 (1912), No. 129, pp. 70-72).—This paper relates to the investigations noted above.

How to fight the pear thrips, G. E. MERRILL (*Mo. Bul. Com. Hort. Cal.*, 1 (1912), No. 2, pp. 51-59, figs. 3).—This is a general account of the pear thrips, its life history, injury, and control measures.

Excellent results are said to have been obtained from the application of a spray of whitewash, consisting of from 75 to 100 lbs. of lime to each 100 gal. of water. It is stated that the cost of the spray should not exceed more than 1 ct. per gallon of prepared material. Care should be taken to secure first-class lime and to see that it is well slaked. The spray should be applied just as the buds begin to separate and the entire surface of the tree should be covered, one application being sufficient.

Eight times as many pears were obtained from trees sprayed in this way as from unsprayed trees.

Scale insects and black blight, G. AUCHINCLOSS (*Imp. Dept. Agr. West Indies, Rpts. Bot. Sta. [etc.] Grenada, 1910-11, p. 15*).—The shield scale fungus (*Cephalosporium lecanii*) was found early in 1910 destroying *Coccus mangiferae* in the botanic gardens in Grenada. It has since been distributed throughout the island on mango leaves. The spread of *Cephalosporium* in 1910 and the earlier part of 1911 is reported to have been extraordinarily rapid and it is now present in nearly all the districts of the island, it being difficult to find a mango tree in Grenada on which the scales are not parasitized by this fungus, or which is not clean of black blight.

The red headed fungus (*Sphaerostilbe coccophila*) has been used in connection with scales on citrus trees but so far without success.

European elm scale in California, C. W. WOODWORTH (*Mo. Bul. Com. Hort. Cal.*, 1 (1912), No. 3, p. 191).—This species is said to occur in great abundance in Stockton, Colusa, Palo Alto, Santa Clara, San José, and Ukiah.

African scale insects, L. LINDINGER (*Jahrb. Hamburg Wiss. Anst.*, 26 (1908), *Beiheft 3*, pp. 13-46, figs. 24; 27 (1909), *Beiheft 3*, pp. 33-48, pls. 4; 28 (1910), *Beiheft 3*, pp. 1-38, pls. 3, figs. 16; *Stat. Pflanzenschutz Hamburg [Ber.]*, 11 (1908-9), pp. 13-46, figs. 24; 12 (1909-10), pp. 33-48, pls. 4; pp. 1-38, pls. 3, figs. 16).—Four papers are presented, namely, (1) Diaspidæ from Kamerun, including descriptions of a new genus (*Cryptodiaspis*) and 20 new species; (2) a South African diaspid resembling the San José scale, namely, *Aspidiotus pectinatus* n. sp.; (3) Coccidæ from East Africa, with descriptions of a genus (*Cryptaspidus*), 10 species, and 1 variety, all new to science; and (4) Coccidæ of the Canary Islands, a contribution to the fauna of the islands. Thirty-nine species of scales are recorded from the Canaries of which 12 are described as new to science.

Control of the codling moth in Arizona with special reference to the Upper Gila Valley, A. W. MORRILL (*Ariz. Hort. Com. Circ.* 15, 1910, pp. 8).—This circular briefly describes methods of dealing with the pest.

Revision of the oriental Tipulidæ with descriptions of new species, E. BRUNETTI (*Rec. Indian Mus.*, 6 (1911), No. 5, pp. 231-314).—This work includes descriptions of 8 genera and more than 50 species new to science.

A revision of the oriental species of the genera of the family Tabanidae other than *Tabanus*, GERTRUDE RICARDO (*Rec. Indian Mus.*, 4 (1911), No. 8, pp. 321-397, pls. 4).—"The genera found in the oriental region, besides the large genus of *Tabanus* proper, are: *Hæmatopota*, Meigen, small flies with peculiarly marked wings; *Udenocera*, Ricardo, formed for a species from Ceylon with the long antennæ situated on a tubercle; *Diachlorus*, Macquart, including chiefly species from South America, distinguished by the simple antennæ not situated on a tubercle, by the brown or yellowish markings of the wings and by the curved dilated fore tibiae, and slender build. One species described from the Philippines is unknown to me. A new genus *Neotabanus* is now added, allied to *Udenocera* in having the antennæ situated on a tubercle, but the antennæ themselves are similar to those of the genus *Tabanus*."

Investigations covering the Mediterranean fruit fly (*Ceratitidis capitata*) in the Hawaiian Islands, E. K. CARNES (*Mo. Bul. Com. Hort. Cal.*, 1 (1911), No. 1, pp. 5-13, figs. 2).—"The author, who was detailed by the state commissioner of horticulture of California to make an investigation of the infestation in the Hawaiian Islands, to study the life history and habits of the pest, and to work out a plan for its eradication in case the pest should gain entrance and appear in California, here presents a preliminary report. Opportunity is taken to give a summarized account of the pest, its life history, habits, and injury."

Another mango pest in the Philippines, P. J. WESTER (*Philippine Agr. Rev. [English Ed.]*, 4 (1911), No. 12, pp. 649-652, pl. 1).—"A fruit fly, probably *Dacus ferrugineus*, destructive to the mango in Java and other parts of Malayasia, is said to have been found in 4 Provinces in Luzon. The author's attention was first drawn to this pest on May 13, 1911, at the Lamo Experiment Station, Bataan."

A note on the habits of the narcissus fly, F. J. CHITTENDEN (*Jour. Roy. Hort. Soc. [London]*, 37 (1911), No. 1, pp. 122, 123).—"The author finds that the narcissus fly (*Merodon equestris*) does not restrict its attacks to narcissus, bulbs of *Habranthus pratensis*, from Holland, and *Vallota purpurea*, from Sierra Leone, having been found to contain larvæ of this pest."

First annual report of the state inspector of apiaries, B. N. GATES (*Agr. of Mass.*, 58 (1910), pp. 199-217, pls. 2).—"In this report the author briefly discusses brood diseases of bees, the usefulness of bees to the agriculturist, importance of inspection of the apiary, etc."

Pollination of red clover by bumblebees, E. LINDHARD (*Tidsskr. Landbr. Planteavl*, 18 (1911), No. 5, pp. 719-737, figs. 2).—"The author presents a résumé of investigations on this subject, and his own observations which lead him to conclude that the honeybee may occasionally aid in the pollination of clover blossoms. Tables state the results of observations made on the work of *Bombus hortorum*, *B. subterraneus*, *B. distinguendus*, *B. lapidarius*, *B. terrestris*, *B. silvarum*, *B. arenicola*, *B. muscorum*, and *Apis mellifica*."

The natural history of the solitary wasps of the genus *Synagris*, E. ROUBAUD (*Ann. Soc. Ent. France*, 79 (1910), I, pp. 1-21, pls. 4; *Ann. Rpt. Smithson. Inst.*, 1910, pp. 507-525, pls. 4).—"This paper relates to solitary wasps of the subfamily Eumeninæ, which inhabit all of Africa except the northern portion and Egypt."

The Ichneumonids of Great Britain, C. MORLEY (*London*, 1911, vol. 4, pp. XVI+344, pl. 1, figs. 41).—"This fourth volume (E. S. R., 22, p. 159) deals with the Tryphoninæ, of which the author recognizes 49 genera and 334 species as occurring in Great Britain."

Technical results from the gipsy moth parasite laboratory.—V. Experimental parasitism: A study of the biology of *Limnerium validum*, P. H.

TIMBERLAKE (*U. S. Dept. Agr., Bur. Ent. Bul. 19, pt. 5, tech. ser., pp. 71-92, figs. 10*).—" *L. validum*, a common parasite of the fall webworm (*Hyphantria cunea*), readily attacks the caterpillars of the brown-tail moth, gipsy moth, and rusty vaporers moths [*Notolophus antiquus*], and also the tent caterpillar, when placed in confinement with these hosts, but is able to complete its transformations in the last species only and even then in but a small percentage of cases. Its larvæ seem to be totally unadapted for life in the caterpillars of the 3 former species, and fail to survive the protective reactions of the host, which are visibly manifested by an accumulation of active blood cells or amœbocytes around the larvæ, the cast eggshells, and even the eggs themselves. The amœbocytes presumably attack the living eggs and larvæ, or at least ultimately efface the latter entirely. The same reaction takes place in the case of the tent caterpillar, but a few of the larvæ are able to complete their transformations. Adaptation here is partially in evidence, and may be due to larval secretions which ward off the protective reactions of the host. . . .

"During its whole life the larva feeds on blood and lymph and on small solid particles which result from the disintegration of the host's tissues, probably pathologically induced by some larval secretion. There is no evidence to show that such definite organs of the host as the digestive tube and muscular tissue can be consumed by the larva unless they are broken down, inasmuch as the mouth parts of the larva throughout life are essentially sucking.

"Under artificial conditions the minimum time needed for the development of the insect from the egg to the adult was found to be about 50 days, but the maximum time may be extended many months. Under natural conditions in the Northern States as a parasite of *Hyphantria*, the females are probably active in parasitizing the caterpillars throughout the month of August and the first part of September. The larvæ issue from the caterpillars and spin their cocoons during September and the first part of October, but the cocoons always overwinter, and the adults emerge the following summer."

A bibliography of 10 titles is appended.

The southern corn root worm in South Carolina (*Diabrotica 12-punctata*), W. A. THOMAS (*South Carolina Sta. Bul. 161, pp. 3-6, pl. 1*).—This bulletin gives a brief account of the life history and remedial measures for the southern corn root worm, or so-called huddworm of corn, based upon observations made by the author in eastern South Carolina while prosecuting studies of the cotton root louse in cooperation with the Bureau of Entomology of this Department.

At Marion the first eggs were deposited on March 10, and had hatched by April 2. The larvæ had all formed earthen cells in which to pupate, or transformed to adult beetles by May 5, and the fully developed beetles had all emerged by May 24. During the winter there is no complete hibernation of the beetles in the vicinity of Marion; at the approach of severe cold, they find shelter beneath the leaves of weeds in the fields and in other protected places until it becomes warmer, whereupon they again begin feeding.

The most practical means of controlling this pest is through cultural operations. The planting of corn on low moist bottom lands, to which the pest confines its ravages almost entirely, should be delayed until the larvæ have begun to pupate. The approximate dates for planting corn in the various sections of the State in order to escape the injury occasioned are set as May 5 for lower South Carolina, May 12 for middle South Carolina, and May 19 for the Piedmont Region.

Locomotion of the larva of *Calosoma sycophanta*, A. F. BURGESS (*Ann. Ent. Soc. Amer., 4 (1911), No. 2, pp. 173-179, pl. 1, figs. 2*).—This is a somewhat

more detailed account than that presented in the bulletin previously noted (E. S. R., 26, p. 350). The apparatus used is described and illustrated.

The distance traveled by a newly hatched larva from 8.30 Saturday morning until its death at 8.45 Tuesday morning, of which time the larva was actually on the recording paper about 70 hours, amounted to 9,058 ft., or 1.71 miles. "The highest rate of travel per minute was during the first $4\frac{1}{2}$ hours, and averaged 4.9 ft. For the first 24 hours the average was 3.69 ft. per minute; during the next 8 hours the average dropped slightly and for the remaining period the average was gradually reduced until the larva died. . . . For the first 36 hours the larva traveled almost continuously, stopping only occasionally for a minute or so to rest. . . . Although the distance traveled is probably much greater than what would actually occur in nature, it is remarkable that so much latent energy can be stored up in an egg of one of these beetles."

"The length of life of the insect is also worthy of note when it is remembered that no food or water was supplied, as it indicates that the young larvae are able to survive several days in the field without food and still have sufficient vitality to make a thorough and active search for their prey."

Collecting ladybirds (Coccinellidæ) by the ton, E. K. CARNES (Mo. Bul. Com. Hort. Cal., 1 (1912), No. 3, pp. 71-81, figs. 7).—This is an account of the work conducted in California, where each year several tons of coccinellids of the species *Hippodamia convergens* are collected and distributed to growers of cantaloups, prunes, apples, pears, vegetables, seeds, and garden truck for the destruction of aphids, even including city street trees and home gardens. "Starting about November 1, the field men go up into the mountains to locate the hibernating colonies, which are usually found among pine needles on sunny, well drained slopes, usually in close proximity to running water. . . . By this time the ladybirds have begun to arrive in the mountains and to assemble in colonies on the stems and about the roots of low growing plants, previous to seeking winter shelter of the pine needles, where they are securely hidden." The collecting of lady beetles commences the last of December and continues until the last of February. Two men usually work together, and with fairly good success collect from 50 to 100 lbs. of beetles in a day.

In order to avoid the heavy expense of artificial cold storage, the beetles are kept at the mountain packing house as long as possible and are then transferred to a large cold storage room rented from a commercial company at Sacramento, and kept at a temperature of slightly under 40° F.

Notes on the Ixodidæ of Brazil, H. DE BEAUBERFIER ARAGÃO (Mem. Inst. Oswaldo Cruz, 3 (1911), No. 2, pp. 145-195, pls. 2).—This paper includes tables for the separation of 46 species of ticks occurring in Brazil, a list of their hosts, and their geographical distribution. Ten forms are considered, 3 of which, *Ornithodoros rostratus*, *Amblyomma pazei*, and *Hæmaphysalis leporis proxima*, are described as new to science.

Notes on the genus *Rhipicephalus*, with the description of new species, and the consideration of some species hitherto described, C. WARBURTON (Parasitology, 5 (1912), No. 1, pp. 1-20, figs. 12).—Three species and 1 variety are described as new to science.

Notes on ticks.—II, New species (*Amblyomma*, *Hæmaphysalis*); *Ixodes putus*: Description of the hitherto unknown larval stage, G. H. F. NUTTALL (Parasitology, 5 (1912), No. 1, pp. 50-60, figs. 9).—This paper includes descriptions of 3 species new to science, namely, *Amblyomma darlingi*, taken from a deer (*Odocoileus* sp.) and a turkey buzzard (*Catharista atratus*) in the Canal Zone; *Hæmaphysalis warburtoni*, and *H. montgomeryi*.

FOODS—HUMAN NUTRITION.

Report of the commission to investigate the subject of the cold storage of food and of food products kept in cold storage (*Boston: State, 1912, pp. 303, chart 1*).—After an exhaustive study of the subject the commission reached a number of conclusions and made recommendations.

"In general, the commission recognizes that cold storage is a fundamental necessity in the distribution of the food supply of the nation. In the first place, it enables perishable food products to be brought to market with the least possible deterioration; in the second place, it enables the surplus of such products in the season of natural plenty to be carried over to meet the demand in the season of natural scarcity. The latter is the principal economic function of cold storage. It acts as a means of distributing the seasonal output of perishable foodstuffs evenly over the market year, thus helping to equalize supply and demand."

The general conclusions reached are thus summarized:

"A progressive deterioration takes place in perishable food products kept in cold storage; the changes naturally occurring are greatly retarded by refrigeration, but are not absolutely suspended. Therefore, a food product that has been held in cold storage is never just as good as the perfectly fresh article, other conditions being equal.

"The deterioration taking place during cold storage first appears in a change in flavor, which may affect the palatability of the food, but does not necessarily affect its wholesomeness or nutritive value.

"The length of time during which an article of food held in cold storage can be kept wholesome and fit for consumption varies for different commodities. The period of proper preservation for any particular commodity depends largely on the methods of handling and preparing for cold storage. Scientific investigation in this field has not yet been carried far enough to enable one to fix normal time limits of cold storage for different commodities.

"On the whole, prolongation of cold storage beyond one year, even under correct conditions, appears to be undestorable, and prejudicial to the public health."

With respect to regulation, the commission recommends:

"Cold storage warehouses should be subject to the supervision of the state board of health, and should be required to take out licenses and submit regular reports. The main object of the proposed inspection is to ensure the proper condition of goods upon entry into storage and their proper treatment during the storage period.

"Food products deposited in cold storage should be marked with the dates of receipt into storage and of withdrawal from storage. . . .

"The time for which food products may be held in cold storage should be limited to 12 months, with discretionary power vested in the state board of health to extend the time limit for particular consignments of goods, and also to fix a shorter time limit than 12 months for any article of food, if such further restriction of the storage period should be found upon investigation to be desirable. . . .

"The fraudulent sale of cold storage products as fresh goods should be prohibited. It is generally admitted that the purchaser has a right to know whether he is getting cold storage or fresh food. . . .

"The return to cold storage of goods that have once been withdrawn and placed on the market for sale to consumers should be prohibited. Such goods are presumably not in fit condition for further storage. The prohibition of

restorage is needed to protect consumers against a practice that unquestionably leads to abuses."

A dissenting opinion is presented by two of the commission with reference to the marking on each package of the date of delivery by cold storage companies.

Supplying a large city with foodstuffs, with particular reference to market conditions in Berlin, E. LANGE (*Staats u. Sozialwiss. Forsch.*, 1911, No. 157, pp. VIII+83).—Statistical and other data are summarized and discussed, and a bibliography is provided.

The preparation of Westphalian hams (*Jour. Roy. Soc. Arts*, 60 (1912), No. 3092, p. 416).—Juniper is used in smoking the meat, the twigs and berries being thrown into a beech wood fire. The juniper imparts a distinctive flavor, it is believed. The smoking process requires on an average about 8 days.

A protein body in Liebig's meat extract, K. MAYS (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 78 (1912), No. 1, pp. 37-52).—The author has isolated and determined the properties of a body present in meat extract which he concludes to be a proteid.

Since the extract is used in small quantities at a time and as a condiment and stimulant, the presence of a small proportion of protein, in the author's opinion, has no special importance from the standpoint of nutritive value. On the other hand, he believes that it is an essential constituent since it favorably influences the consistency of the meat extract.

The chemical composition of human milk as shown by recent analyses, E. SCHLOSS (*Monatsschr. Kinderheilk.*, 9 (1910-11), pp. 636-640; *qbs. in Zenbl. Expt. Med.*, 1 (1912), No. 1, p. 14).—Contrary to the generally accepted opinion, the author maintains that human milk has a constant composition. The fat content varies, but all the other ingredients maintain a definite relation. He presents a compilation of 8 analyses.

Influence of age on wheat and flour, F. T. SHUTT (*Canada Expt. Farms Rpts.* 1911, pp. 168-171).—Continuing earlier work (*E. S. R.*, 24, p. 465), the composition and bread making quality of wheat stored for 2 years were studied.

In general, no differences or changes were noted in chemical composition of the samples stored as flour, though there was a tendency in the gliadin and the gliadin ratio to increase. Conclusions regarding the gluten were not drawn.

Five of the 7 samples stored as wheat showed slight increases in protein content; the gliadin values were very similar to those obtained in the earlier work.

A consideration of the nitrogen-and-ash-free extract and the volume of the loaf did not indicate that there was any relationship between these values, the contention that the volume of the loaf increases with the amount of extract not being supported by the data reported. Furthermore, no relationship was noted between the ratio of soluble ash to total nitrogen and the shape of the loaf.

Chemical analysis and composition of imported honey from Cuba, Mexico, and Haiti, A. H. BRYAN, A. GIVEN, and S. SHERWOOD (*U. S. Dept. Agr., Bur. Chem. Bul.* 454, pp. 21).—The results are reported and discussed, in comparison with American honeys, of 33 samples of Cuban, 23 samples of Mexican, and 16 samples of Haitian honeys. The methods followed in the investigation are described.

According to the authors' summary, the results seem to show that "beyond a slightly greater moisture content and a somewhat lower percentage of sucrose there are no pronounced differences in chemical composition between the honeys of America and those from the countries specified. Other points, however, must be considered."

Attention is directed to the fact that American foul brood is prevalent in Cuba and that while honey from infected colonies of bees is not injurious to human beings, the danger to bees constitutes a serious objection to the unguarded importation of Cuban honeys and affords an additional reason for barring from importation undesirable Cuban honeys.

Furthermore, as pointed out by the authors, "the preparation of the honey for shipment was very poor. The extraction had been carelessly carried out, and much dirt was present in the samples as received. . . . The honey is mostly wild or that from wild bees, is scooped out of the trees by the natives, allowed to drain through coarse cloth, and shipped either in tins or barrels. In only two cases was the product such as could be sold for direct consumption, these two being comb honey.

"Again, with few exceptions the flavor was rank and strong, so that it could hardly be considered palatable. There is some honey of good flavor produced in these places, but it is not exported in any quantity.

"Considering the physical condition of the samples as received in nearly all cases, it can be said that they were not fit for human consumption. Reextraction, straining, etc., might improve this condition, but it is a question whether even under this treatment the honey is made fit for table use, as the dirt has become so intimately mixed as not to be removed by physical means."

A bibliography of chemical literature of honey from 1907 to 1911, compiled by A. H. Bryan, is appended to the report, and supplements earlier compilations (E. S. R., 13, p. 1058).

The nitrogenous constituents of fungi, CAMILLE REUTER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 78 (1912), No. 3-4, pp. 167-245).—In addition to an exhaustive summary of data previously published, the author reports the results of extended investigations.

The hydrolysis of protein from fungi yielded the following amino acids: Glycocoll, alanin, valin, leucin, phenylalanin, prolin, aspartic acid, and glutaminic acid. Especially to be noted is the high content of the two low amino acids and prolin. After digestion with trypsin tyrosin was found. From dried fungi the following bases or amino acids were isolated: Guanin, adenin, hypoxanthin, trimethylhistidin, cholin, trimethylamin, putrescin, guanidin, phenylalanin, leucin, and racemic alanin. Especially noteworthy is the occurrence of racemic alanin, which constitutes the greater portion of the free amino acids present.

As the author points out, cases of poisoning often occur after eating edible fungi which are attributed to the formation of toxic compounds by bacteria. It is also possible that in processes of digestion substances with marked physiological properties such as agmatin, paraoxyphenyläthylamin, and imidazolyäthylamin are formed by cleavage from the amino acids and bases primarily formed from the protein.

In the author's opinion it would be especially important from a biological standpoint to study the ferments present in fungi which induce carbohydrate cleavage and play a very important rôle in the formation of the simple plant bases which are physiologically active.

The presence of glutaminic acid in preserved tomatoes, N. MONTI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 11-12, pp. 813-823; *abs. in Chem. Zentbl.*, 1912, I, No. 7, p. 501).—By a method which he describes the author isolated glutaminic acid from preserved tomatoes, the quantity being in the proportion of 80 gm. per 60 kg. of material.

[Food inspection and other pure food and drug topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul.*, 2 (1912), No. 4, pp. 49-55, 58-80).—The results of the examination of a number of miscellaneous food

products as well as the results of a study of headache powders are reported. Some data are given regarding lard and lard substitutes and other food and drug matters.

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 1455, pp. 57*).—This notice of judgment has to do with the alleged adulteration and misbranding of coca cola. Some analytical data are included.

Food values—practical tables for use in private practice and public institutions, M. A. LOCKE (*New York and London, 1911, pp. VII+110*).—In this small volume the author has briefly discussed foods and their uses and similar topics and has presented a large amount of data in tabular form, including the equivalents of weights and measures used in connection with foods and dietetics, the composition of prepared and cooked foods and of alcoholic beverages, and the average composition of American foods in general.

As the author states in his preface, "information has been drawn largely from the numerous reports of investigations made under the direction of the United States Department of Agriculture."

The book is provided with an index.

Directions for preparing diet for health and disease, G. REYMAN (*Diätetische Kost-Vorschriften, zum Gebrauch in gesunden und kranken Tagen. Lusterecken, 1911, pp. 411*).—General questions of dietetics are discussed and lists are given of the foods in season during different months of the year, together with a large number of recipes and a collection of menus for normal diet and for diet for diabetics and those suffering from liver, kidney, and nervous diseases, from gout, from obesity, and from diseases of the digestive tract, the various diets being arranged in parallel columns. A large number of menus for different seasons are also presented, as well as menus for special occasions.

A bibliography is given of books which the author considers useful, and a list of German periodicals which deal with the preparation of food and similar topics.

[Artificial feeding and poverty and the rate of infant mortality], M. GREENWOOD and J. W. BROWN (*Jour. Hyg. [Cambridge], 12 (1912), No. 1, pp. 5-45*).—The authors discuss particularly the effects of artificial feeding and poverty upon birth-rate and infant mortality. Of special interest is the discussion of the handling and use of statistical data. A bibliography is included.

Concerning the influence of the extractives of meat upon the digestibility of vegetable food, H. WOLFF (*Ztschr. Klin. Med., 74 (1912), No. 3-4, p. 303; abs. in Zentrbl. Biochem. u. Biophys., 18 (1912), No. 1-2, p. 21*).—From experiments which were made with dogs the author concludes that the addition of meat extract favorably influenced digestion and nitrogen metabolism.

The increased fat excreted in the feces when meat extract was taken is thought to be fat produced by the organism as a result of stimulation by meat extract and not as undigested from the diet.

The effect of a diet of polished rice on the nitrogen and phosphorus of the brain, C. FUNK (*Jour. Physiol., 44 (1912), No. 1-2, pp. 50-53*).—Experiments were made to ascertain whether differences could be detected between the contents of nitrogen and phosphorus in the brains of normal pigeons and those suffering from polyneuritis, produced by a diet of polished rice.

"The analysis of the brains shows a sensible diminution from the normal of nitrogen and phosphorus content, in a proportion which suggests a breakdown of the lipoids of the brain."

The physiological effect of benzoic acid and sodium benzoate, V. GERLACH (*Physiologische Wirkungen der Benzoesäure und des benzoesauren Natron. Wiesbaden, 1909, pp. 8+95, pls. 10*).—The results of extended experiments are

reported upon the preservative properties and toxic effects of benzoic acid and the effects of benzoic acid and sodium benzoate upon the heart, the red corpuscles, and blood pressure. The results of digestion experiments, including tests in vitro, with small animals and man, and of metabolism experiments with man are presented.

The conclusions which the author reached were in effect as follows:

Benzoic acid and sodium benzoate, even in quantities as low as 1 to 1,000, acted as a preservative with chopped meat, and also prevented mold formation on oleomargarine for 52 days.

Cold-blooded and warm-blooded animals (frogs and rabbits) were able to bear, even for a long period, considerable quantities of benzoic acid and sodium benzoate supplied in different ways. When 1 gm. sodium benzoate per kilogram of body weight was injected into rabbits for 12 days no loss in body weight was noted. Larger doses temporarily lowered body temperature. No effect was noted on respiration and pulse. When 2.2 gm. or more of sodium benzoate per kilogram of body weight was used the animals died. When 5 gm. benzoic acid, or 7 gm. sodium benzoate, was fed at a time with 500 cc. of milk to a dog of medium weight, respiration, pulse rate, and body temperature were not noticeably affected.

In an experiment of which the author himself was subject 10 gm. benzoic acid taken within 3½ hours produced no noticeable effect upon respiration, body temperature, digestion, or general condition.

When from 0.5 gm. to 1 gm. sodium benzoate per day was taken for 44 consecutive days no effects were noted and body weight remained normal in all the subjects. Respiration, pulse, and body temperature were not noticeably affected when 1 or 2 gm. benzoic acid or sodium benzoate was taken.

Benzoic acid and sodium benzoate affected the red blood corpuscles in the same general manner as acids and salt solutions, respectively.

Injections of 4 cc. of a 5 per cent solution of sodium benzoate had no effect upon the heart frequency of a frog, nor did the injection of 1 cc. of a 20 per cent solution given within an hour.

Sodium benzoate intravenously injected into a suspended frog heart had less effect than sodium chlorid solution of equal concentration. The same was found to be the case in experiments with surviving cat heart. In the case of rabbits the blood pressure was influenced only very slightly and temporarily.

As shown by the experiments reported, neither gastric juice, trypsin, nor diastatic ferments were affected by the addition of benzoic acid or sodium benzoate. In the case of a dog with a Pawlow fistula no effect upon the quantity supplied or the digestive power of the gastric juice was observed when 3 gm. benzoic acid, or 5 gm. sodium benzoate, was taken.

As shown by a test breakfast, withdrawn after an hour, the author himself being the subject, 0.5 gm. benzoic acid, or 1 gm. sodium benzoate, did not influence the amount of free hydrochloric acid, the total acidity, or digestive power.

No effect was noted upon the protein condition of the body or the digestibility of protein and fat in experiments with men, when 1 gm. benzoic acid, or 1.5 gm. sodium benzoate, per day was taken for 6 days.

Daily doses of 1 gm. benzoic acid taken for 82 out of 86 and 88 out of 92 days did not cause any noticeable effect upon general condition, body weight, etc. At the conclusion of the test it was found that benzoic acid taken either with a mixed diet or with a vegetable diet was fully converted into hippuric acid.

The literature of the subject is discussed at length and a bibliography is appended.

Calorimetric observations on man, J. S. MACDONALD (*Jour. Physiol.*, 44 (1912), No. 1-2, pp. IV, V).—A brief account is given of a calorimeter modeled on the Atwater-Rosa-Benedict apparatus devised at Middletown, Conn., having the same general dimensions, and protected from surface loss or gain of heat in the same manner. The calorimeter is not equipped to deal with the respiratory exchange of gases and is therefore not a respiration calorimeter.

"Departures from the original model have been made, notably in an extension of the internal radiator system and the insertion of an additional internal source of heat. The latter arrangement is used as a compensating system whereby the total heat measurement is maintained as far as possible a constant. The heat output of the subject is found by subtracting from this the momentary values for the heat output of the compensating system.

"This change in method is due to experimental observation of a definite relation between the temperature of the calorimeter (T_c) and the mean temperature of the internal system (T_r) such that the heat measured by reference to the temperature and quantity of the water stream $= k (T_c - T_r)$.

"The value of " k " in this calorimeter was such as to render difficult all attempts to follow abrupt variations in the subject's heat output. Thus when a period of work interrupted a period of rest it became evident that $T_c - T_r$ must have a new value of perhaps 8°C ., entailing a sudden change in the temperature of the water entering the radiator system of 10°C . Because of the slow rate, and the lack of precision, with which such alterations in temperature could be obtained the preceding method was adopted."

The data obtained every 5 minutes throughout an experiment are of three kinds: "(1) Heat stored in, or lost from, the calorimeter walls as inferred from observed variations in temperature; (2) heat removed by water traversing an internal radiator system; (3) heat stored in a change of state in water, and measured by reference to the excess aqueous vapor leaving the calorimeter in the air stream."

Experiments have been performed with a number of subjects under alternating conditions of work and rest and in two instances with a subject asleep.

According to the author, the most interesting features of the results obtained, briefly stated, are as follows:

"The performance of work entails an increased heat output which gradually rises toward a maximum reached at the end of about $1\frac{1}{2}$ hours. This maximum is then maintained until the cessation of work.

"In order to discover the degree to which this initial portion of the heat output curve is rendered gradual by a storage of heat in the subject's body as evidenced by a coincident rise in body temperature, the latter has in the most recent of these experiments been measured . . . [by a thermocouple method]. We have not, so far, found sufficient variations in temperature to explain the whole effect, though their nature is always such as to explain some fraction of this. It would appear, then, that the 'efficiency' diminishes as the temperature of the body increases."

A new calorimeter for small warm-blooded animals, A. V. HILL (*Jour. Physiol.*, 44 (1912), No. 1-2, pp. I, II).—A small calorimeter for warm-blooded animals is described, the essential details being: "(1) A large cylindrical Dewar flask of depth 40 cm. and diameter 10 cm.; (2) a coil of fine copper tubing inside the flask, through which water runs at a uniform rate to take away the heat formed; (3) a thermocouple with its ends in (a) the water going into the flask, and (b) the water coming out of the flask; (4) a galvanometer in another part of the laboratory registering the current through the thermocouple; (5) a Mariotte bottle supplying water at a uniform rate;

(6) a cage of perforated zinc which can be drawn in and out of the flask; (7) tubes for an air supply to the inside."

In operating this calorimeter the temperatures of the water are taken by means of the thermocouple just at its entrance and exit. The observed difference in temperature multiplied by the quantity of water flow per minute gives the heat in calories. The Dewar flask used as a calorimeter chamber is mounted in a box of sawdust, and the water used to take up the heat generated passes around a lead coil outside the flask before passing around the coil inside the flask. "Thus the outside is kept permanently at the temperature of the water which goes in, and it is then found that by this differential arrangement the heat loss is proportional to the actual galvanometer deflection; for 1° C. registered by the galvanometer there is a loss of some 2.9 calories per 1 minute."

Electrical checks tests show a very close agreement between the calculated and observed heat production.

ANIMAL PRODUCTION.

General review of zoology, I. M. CAULLERY (*Rev. Gén. Sci.*, 23 (1912), Nos. 9, pp. 353-359; 10, pp. 395-402).—This is a review of the literature published in 1910 and 1911 on heredity, variation, evolution, Mendelism, predetermination of sex, and related topics.

The mechanistic conception of life, J. LOEB (*Pop. Sci Mo.*, 80 (1912), No. 1, pp. 5-21).—It is pointed out that the controversy between the vitalists and mechanists is of little importance as regards the progress of biology, but is of vital interest when the results of biological studies are applied to ethical and sociological problems. Recent work has shown that the activation of the egg by the spermatozoa is a chemico-physical process; that individual life begins with the acceleration of the oxidation in the egg, and is not determined by the entrance of a metaphysical life principle; and that the study of heredity is to-day the study of an exact science, and not merely the field of the metaphysician and rhetorician.

These results have been obtained by physico-chemical research, and are cited in support of the mechanistic conception of life, which the author states is the only one compatible with ethics because instincts are based on chemical mechanism.

The comparative physiology of response in animals, J VON UEXKÜLL (*Umwelt und Innenwelt der Tiere. Berlin, 1909, pp. 259; rev. in Science, n. ser., 31 (1910), No. 791, pp. 303-305; Nature [London], 83 (1910), No. 2116, pp. 331, 332*).—A summary of studies on the relation of the organism to its environment, which is of interest to the physiologist and psychologist. The topics discussed are the nature of protoplasm, the conversion and differentiation of fluids into organs, and the comparative physiology of reflexes in the lower animals.

The behavior of chicken sarcoma implanted in the developing embryo, J. B. MURPHY and P. ROUS (*Jour. Expt. Med.*, 15 (1912), No. 2, pp. 119-132, pls. 6).—Among the conclusions reached are the following: "The direct inoculation of a sarcoma of the fowl into the developing chick embryo or its membranes has yielded growths in many cases. The best results have been obtained with grafts of the living tumor tissue, but, as in the adult, growths can be engendered with dried tissue or with the Berkefeld filtrate of a tumor extract. When living tumor tissue is used, an actual transplantation occurs . . . Relatively speaking, the embryo seems much more favorable than the adult as a host for the sarcoma."

The structure of reproductive organs of domesticated animals, R. SCHMALTZ (*Die Struktur der Geschlechtsorgane der Haussäugetiere*. Berlin, 1911, pp. XII+333, figs. 168; abs. in *Jour. Roy. Micros. Soc.* [London], 1911, No. 6, p. 743).—A monograph on the generative organs of the horse, ox, sheep, pig, dog, and cat.

The function of the accessory reproductive glands in male mammals, E. IWAŃCOW (*Arch. Mikros. Anat.*, 77 (1911), No. 2, II, pp. 240-248; abs. in *Jour. Roy. Micros. Soc.* [London], 1912, No. 2, p. 167).—The author concludes that the main function of the accessory male reproductive glands is to supply a diluting medium for the spermatozoa. The secretion of the prostate also contains elements which apparently contribute to fermentative processes, and which seem to increase the locomotor energy of the spermatozoa and to shorten their length of life.

The origin of sexual differences, P. KAMMERER (*Fortschr. Naturw. Forsch.*, 5 (1912), pp. 1-240).—A systematic summary and critical discussion of the nature and causes of sex, effect of castration, and related topics.

A bibliography of about 700 references is appended.

Recent work on the determination of sex, L. DONCASTER (*Ann. Rpt. Smithson. Inst.* 1910, pp. 473-485).—A reprint, with additions, of an article noted from another source (*E. S. R.*, 22, p. 273).

Historical-critical studies on hair and hair colors in domesticated animals, with special reference to abnormal whitening, H. WIEGMANN (*Historisch-kritische Studien über Haar- und Hautfarben bei Haustieren mit besonderer Berücksichtigung des Albinismus und Leucismus*. Inaug. Diss., Univ. Bern, 1910, pp. 48).—A review of the literature on the causes of localization of pigment in horses, cattle, sheep, and swine.

Concerning an important kind of hair and the hair coat system of mammals, K. TOLDT, JR. (*Ann. K. K. Naturhist. Hofmus.* [Vienna], 24 (1910), No. 1-2, pp. 195-268, pls. 4, fig. 1).—The morphology, physiology, and distribution of different kinds of hair in mammals are treated in detail. A bibliography is appended.

Comparative anatomy of supernumerary digits in certain ungulates as evidence of the interrelationship existing between the various species, J. SHARE-JONES (*Vet. Jour.*, 67 (1911), Nos. 429, pp. 145-157; 432, pp. 344-355, figs. 10).—A comparative study of abnormal digits in the horse, ox, and pig. The principal structures noted in detail are the bones, tendons, and ligaments.

The continuous origin of certain unit characters as observed by a paleontologist, H. F. OSBORN (*Amer. Nat.*, 46 (1912), Nos. 544, pp. 185-206; 545, pp. 249-278, figs. 8).—The author's studies of the skull and horns of Titanotheres, the horns of cattle, the cranium of man, and the skull and teeth of horses indicate that discontinuity in heredity affords no evidence whatever of discontinuity of origin, and that new characters arise by excessively fine gradations which appear to be continuous. If discontinuities or steps exist they are so minute in these characters as to be indistinguishable from those fluctuations around a mean which seem to accompany every stage in the evolution and ontogeny of unit characters.

"Because the grosser form of Lamarckian interpretation of transmission of acquired characters has apparently been disproved, we must not exclude the possibility of the discovery of finer, more subtle relations between the germ plasma and the soma, as well as the external environment."

The inconstancy of unit characters, W. E. CASTLE (*Amer. Nat.*, 46 (1912), No. 546, pp. 352-362).—In opposition to the views of the genotype and pure line advocates, the author finds that by constant selection in one direction a character may be modified gradually, and cites examples of his own experience in

support of his argument. Thus, a silvered variety of guinea pig was produced by systematic selection from a tri-colored race. The silvered area was gradually increased from an individual which had white hairs interspersed with red on the lower side of the body. In experiments with hooded rats, involving 12 generations and over 10,000 individuals, the pigmented areas were increased in one series and decreased in another by systematic selection. The view is held that the causes of variability are not necessarily located in the chromosome of the cell.

Mendelian proportions and the increase of recessives, F. RAMALEY (*Amer. Nat.*, 46 (1912), No. 546, pp. 344-351).—This is a study of stable ratios involving Mendelian dominants, heterozygotes, and recessives as exemplified in the inheritance of left-handedness. The author states that the same results will apply to any recessive character when not selected against in mating. Recessive characters tend to increase in numbers at the expense of original dominant types if not inherently weak in some respect.

"These conclusions are reached from a consideration of the following points: (1) The greater ease with which characters may be lost than gained; (2) the great number of combined dominants and heterozygotes which through mutation may reach a simpler condition as compared with the small number of recessives and heterozygotes which may be imagined as affording opportunity for mutation to dominance; (3) the more likely survival of recessives in an environment of changing conditions in which now the dominant and now the recessive is hard pressed to maintain its existence."

Mendel's laws and stock breeding, J. WILSON (*Hoard's Dairyman*, 42 (1911), No. 47, p. 1442).—An explanation of the principles of Mendelian inheritance so that it can be understood by the stock breeder.

Mendelism and sex inheritance, E. RAIL (*Hoard's Dairyman*, 43 (1912), No. 13, p. 592).—A criticism of the article noted above, in which it is maintained that it has not yet been proved that sex is a Mendelian character, and if so would be operative all the time.

Mendel's law and the occurrence of sex (*Farm Poultry*, 23 (1912), No. 5, pp. 151, 152).—A discussion of Whitman's work regulating sex in pigeons, as reported by Riddle and of an article by Peck previously noted (*E. S. R.*, 26, p. 773). Concerning the latter the author says: "It fails to account for the male that produces principally females, however mated; and the female that produces principally males. The most conspicuous cases of excess of one sex that I have known or heard of in poultry were cases of males that produced a large excess of females, however mated."

Are horns in sheep a sex-limited character? W. E. CASTLE (*Science*, n. ser., 35 (1912), No. 902, pp. 574, 575).—A criticism of the conclusions in the article of Arkell and Davenport, noted previously (*E. S. R.*, 26, p. 769). The author considers that the assumption of an inhibiting factor is superfluous, as Bateson's hypothesis that the horn character is dominant in males and recessive in females is adequate to explain the results obtained.

A critical examination of recent studies on color inheritance in horses, A. H. STURTEVANT (*Jour. Genetics*, 2 (1912), No. 1, pp. 41-51).—A résumé of papers dealing with English Thoroughbreds, Shires, Scotch Clydesdales, French Percherons, and the American Harness horse. The work is summarized as follows:

"It seems probable that chestnut always breeds true. Therefore the placing of chestnut or yellow at the bottom of the scale probably represents the condition of nearly all breeds of horses. Epistatic to it is black. Next comes, in the breeds studied, bay or brown, epistatic to both the preceding. Gray is next higher. Next is roan, which is probably always evident when present (unless

suppressed by the next factor, white), and which probably merely causes a sprinkling of white hairs, without otherwise affecting the color. Finally, we have white."

Hybridization studies.—V, Spermatogenesis in hybrids, H. POLL (*Arch. Mikros. Anat.*, 77 (1911), No. 2, II, pp. 210-239, pl. I, figs. 3; *abs. in Jour. Roy. Micros. Soc. [London]*, 1912, No. 2, p. 167).—The author studied the reproductive organs of hybrid ducks (*Cairina moschata* and *Anas boschas*) and of a year-old mule. The tissues of the hybrids were found similar to those of the pure type, except in the development of the reproductive cells.

A bibliography is appended.

The domesticated animals of ancient Egypt, P. KUSCHEL (*Die Haustiere Agyptens in Altertum. Inaug. Diss., Univ. Leipzig*, 1911, pp. 45).—A study of data furnished by inscriptions on monuments and other historical sources concerning the animal husbandry of the ancient Egyptians.

A bibliography is appended.

The extinct fauna of Crete and its relation to the Minotaur legend, C. KELLER (*Vrtljschr. Naturf. Gesell. Zürich*, 54 (1909), No. 3-4, pp. 424-435, fig. 1).—From a study of fossils found on the island, the author concludes that *Sus scrofa*, *Cervus elaphus*, *Capra agagrus*, *Bison europæus*, and *Bos primigenius* existed there as wild animals in the time of Minos. Bones of tame swine were found, but are supposed to belong to *Sus indicus*. The palace at Knossos contains works of art, in which *Bos primigenius* is depicted as domesticated and used in bull fighting in premycenaean times. It is suggested that this gave rise to the Minotaur myths.

Report of the Live Stock Commission, New Jersey, E. T. GILL ET AL. (*Rpt. Live Stock Com. N. J.*, 1910-11, pp. 58, pls. 12).—A summary of the activities of the live stock commission in directing and encouraging breeders in their efforts toward improving the various breeds of live stock found within the State. There is a list of breeders of pure-bred live stock in the State, and a directory of certified stallions now in service.

Fodders and feeding stuffs, F. T. SHUTT (*Canada Expt. Farms Rpts.* 1911, pp. 181-183).—An analysis of burnet (*Poterium canadense*) is given as follows: Water 80.24, protein 3.87, fat 0.24, carbohydrates 4.11, fiber 9.75, and ash 1.79 per cent. Analyses are also reported of cotton-seed and linseed meals.

[Analyses of feeding stuffs], R. E. ROSE and E. P. GREENE (*Fla. Quart. Bul. Agr. Dept.*, 22 (1912), No. 2, pp. 186-192).—Analyses are reported of cotton-seed meal, dried beet pulp, wheat middlings, molasses feed, and proprietary mixed feeds.

Feeding stuffs, J. A. VOELCKER (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 365-370).—Analyses are reported of cotton-seed cake, coconut cake, bran, sugar beets, acorus, and a mixture of molasses and wood fiber sold under the name of "bastol."

[Feeding experiments in 1910], J. H. GRISDALE, R. ROBINSON, J. MURRAY, and G. H. HUTTON (*Canada Expt. Farms Rpts.* 1911, pp. 71-76, 76-80, 341, 342, 380-387, 507-509).—This continues work previously noted (*E. S. R.*, 24, p. 471).

Tests in feeding Angus and Shorthorn steers various proportions of bran, gluten meal, oil-cake meal, clover hay, corn silage, turnips, mangels, and oat straw are reported. Five lots of 20 steers made average daily gains for 290 days ranging from 1.47 to 1.74 lbs., at costs ranging from 4.8 to 8.3 cts. per pound. Subsequently 4 lots of 18 steers made average daily gains for periods of from 62 to 70 days ranging from 1.09 to 2.2 lbs., at costs ranging from 6.66 to 9.44 cts. per pound.

In other tests 64 steers made a gain of 1.64 lbs. per head and day for 165 days at a cost of 9.74 cts. per pound, and 20 steers a daily gain of 1.48 lbs. for 157 days at a cost of 11.25 cts. per pound.

An experiment in sheltering cattle gave the following results for 155 days: With outside feeding the average daily gain per head was 1 lb., at a cost of 18.53 cts. per pound, and the loss per steer was \$1.84. Steers fed inside gained on an average 1.56 lbs. per head and day, at a cost of 7.73 cts. per pound, and returned a surplus over the cost of feeding of \$13.77. It is stated that the small gains made were due to the method of feeding. Oat straw was used for roughage and was not liked by any of the animals.

In a comparison of corn silage and roots for fattening lambs, 3 lots of 9 lambs each were fed 124 days. Lot 1, receiving turnips ad libitum, made average daily gains per head of 0.24 lb. at a cost of 8.8 cts. per pound. The corresponding gains for lot 2, receiving silage ad libitum, and lot 3, receiving both turnips and silage ad libitum, was 0.29 and 0.27 lb., and the cost 7.03 and 7.76 cts. per pound. It is concluded that silage is superior to turnips for fattening lambs, and that it can be profitably used as a part of the roughage ration.

A test of different rations for pigs gave the following gains per head and day for 86 days: Chopped barley 0.9 lb., at a cost of 3.19 cts. per pound; barley and tankage 1.04 lbs., at a cost of 3.72 cts.; peas, oats, and barley 0.85 lb., at a cost of 3.32 cts. per pound; mixed grain and tankage 0.86 lb., at a cost of 4.1 cts. per pound; and mixed chop and tankage 1.23 lbs., at a cost of 4.4 cts. per pound.

Fattening beef calves in Alabama, D. T. GRAY and W. F. WARD (*Alabama Col. Sta. Bul. 158, pp. 175-224c, figs. 17*).—The first experiment reported was to determine the cost of finishing 77 high-grade calves for market on different feeds. Three lots from 6 to 8 months old were kept for 4 months on a basal ration of cotton-seed hulls and alfalfa hay. Lot 1, on a supplementary ration of cotton-seed meal, made an average daily gain of 1.71 lbs. at a cost of 6.22 cts. per pound; lot 2, with cotton-seed meal and corn-cob meal in the proportion of 2:1, made an average daily gain of 1.76 lbs., at a cost of 6.19 cts. per pound; lot 3, with cotton-seed meal and corn-cob meal in the proportion of 1:2, made a gain of 1.83 lbs., at a cost of 6.83 cts. per pound. The third lot gave a larger percentage of dressed weight and sold for better price, but not enough more to pay for the extra cost of feed.

To determine if calves can be fattened profitably for the spring market on a feed of cotton-seed meal, cotton-seed hulls, and mixed peavine hay, 52 calves were divided into 2 lots, one lot receiving the shelter of a good barn, and the other fed in the open; but as it was found that the young calves would not thrive during the winter months without shelter the entire lot was placed in sheds. During a period of 112 days the average daily gain for the entire lot was 1.24 lbs., at a cost of 6.97 cts. per pound. Each calf netted a profit of \$3.50.

A test was made in wintering calves and fattening them the following summer on pasture. Thirty-four calves were wintered on cotton-seed meal and hulls, corn chop, and alfalfa hay. The average daily gain for 112 days was 1.13 lbs., at a cost of 8.63 cts. per pound. On March 25 they were turned on good pasture, and in 89 days made an average daily gain per head of 1.33 lbs., at a cost of 4.84 cts. per pound. The profit for each calf was \$1.86.

Among the conclusions drawn are the following: "A farmer may expect to obtain a reasonable profit on beef calves when he raises and fattens them on his farm and sells them when they are 12 to 14 months old. . . . In the South, at least in Alabama at the present time, the calves should be born dur-

ing the early spring months. . . . Young calves can be finished for the market at a profit on cotton-seed meal, cotton-seed hulls, and peavine hay, but it is more profitable to introduce corn-and-cob meal to take the place of part of the cotton-seed meal. . . . The tests seem to indicate that it is more profitable to feed a heavy ration and sell the calves at the end of the winter months, when the prices are normally high, than to hold them until the early summer months.

Shorthorn herds in Ireland, 1911 (*Dept. Agr. and Tech. Instr. Ireland Jour.*, 12 (1912), No. 2, pp. 232-274, pls. 30).—A brief account of the pure-bred Shorthorn herds in Ireland.

Sinus hairs of the ox, D. TRETJAKOFF (*Ztschr. Wiss. Zool.*, 97 (1911), No. 2, pp. 314-416, pls. 4; *abs. in Jour. Roy. Micros. Soc.* [London], 1912, No. 1, p. 31).—The author describes the nerve endings in connection with the sinus hairs about the snout, lips, and other parts of the ox. It is thought that the sinus hairs play an important part in the recognition of different kinds of plants.

Wool, A. F. BARKER (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 62-85, figs. 11).—This discusses the quality of wool fiber, yarns, and woolen fabrics, influence of breed and environment on variation in wool fiber, relative values of heavy and light fleeced sheep, and allied topics.

Pig-feeding experiments, J. M. SCOTT (*Florida Sta. Rpt.*, 1911, pp. XVI-XIX).—In a feeding test involving 5 lots of 5 pigs each, and lasting 60 days, the total gains for each lot were as follows: On velvet beans in the pod, 25 lbs.; velvet beans in the pod and Japanese cane 1:1, 4.3 lbs.; velvet beans in the pod and Japanese cane 2:1, —7.7 lbs.; Japanese cane alone, 61 lbs.; and velvet beans in the pod and sweet potatoes 1:1, 12.3 lbs.

In a feeding test which lasted 90 days and with 5 pigs in each lot, those given shelled corn made an average gain per head and day of 0.26 lb., at a cost of 8.19 cts. per pound; shelled corn and culled velvet beans 1:1 by weight 0.17 lb., at a cost of 9.96 cts. per pound; shelled corn, culled velvet beans, and shorts 1:1:1, 0.26 lb., at a cost of 8.98 cts. per pound; and shelled corn and culled velvet beans 1:1, and all the green sorghum they would eat, 0.24 lb., at a cost of 7.96 cts. per pound.

Seventeen pigs 3 months of age, when put on a ration of corn, shorts, milk, and green sorghum, made in 30 days an average daily gain per head of 0.96 lb.

The pig industry, R. T. ARCHER (*Jour. Dept. Agr. Victoria*, 10 (1912), Nos. 2, pp. 73-82; 3, pp. 160-169; 4, pp. 239-255, figs. 27).—This contains information on breeds of pigs, cooperative bacon factories, the international trade in pork products, and statistical data on the pig industry.

Studies on conformation, function, and pilosity in horses, W. KRYNITZ, H. MAGERL, and A. RAST (*Arb. Deut. Gesell. Züchtungsk.*, 1911, No. 11, pp. 208, figs. 4).—This contains 3 articles. The first two, by Krynitz and Magerl, discuss the correlation between form and function of the different types of horses. A large number of measurements are submitted, and both authors think that the adaptability of the horse to slow or fast work can be predicted with a reasonable degree of accuracy by making measurements. The third article, by Rast, is a study of the characters of the hair and hair whorls as an aid in judging horses.

Bibliographies are appended.

Feed, care, and management of breeding stallions, brood mares, work horses and young foals, F. C. MINKLER (*Live Stock Com. N. J. Circ.* 2, 1912, pp. 30, pls. 3).—This contains general information of interest to horse breeders, a list of stallions now in service, and a copy of the state stallion law.

The horse-breeding industry in Yorkshire, H. E. FAWCUS (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 85-116).—A historical account of the types of horses which have been bred in Yorkshire, including a general discussion of the condition of the horse-breeding industry.

Report of the poultry manager, A. G. GILBERT (*Canada Expt. Farms Rpts.* 1911, pp. 277-294, pl. 1).—This contains statistics on prices and production of poultry, discusses the grading of poultry and eggs and the sale of poultry products through cooperative societies, and reports experimental work at the station.

As regards fertility of eggs there seemed to be no advantage in limiting the males to a small number of hens. The percentage of eggs hatched by hens was larger than that hatched by incubator. On a free range the chickens gained 1.15 lbs. each in 2 months, while on a limited run the gain was 2.45 lbs. Experiments by F. T. Shutt in the preservation of eggs indicated that lime-water is superior to water glass as a preservative.

Housing farm poultry, A. G. PHILLIPS (*Indiana Sta. Circ.* 37, pp. 16, figs. 21).—A trap nest, oat sprouter, and several poultry houses are illustrated and described.

Egg records for the year 1910-11 (*Dept. Agr. and Tech. Instr. Ireland Jour.*, 12 (1912), No. 2, pp. 374-387).—This contains egg records of 153 flocks of fowl.

The important subject of eggs, G. B. MOASE (*Rel. Poultry Jour.*, 19 (1912), Nos. 3, pp. 403, 494, 525-528; 4, pp. 656, 657, 685-688).—This article reviews investigations on the bacteriology of the hen's egg. Summing up the work, the author states that fresh eggs laid by healthy virgin pullets are generally free from bacteria, whereas hens that have been mated or that have diseased ovaries lay eggs which are liable to be infected. The source of external infection and the transmission of disease to man and other fowls from infected eggs are discussed. Different methods of preserving eggs are described.

Preservation of eggs by freezing, F. LESCARDÉ (*Ber. II. Internat. Kälttekong. Wien*, 2 (1910), pp. 373, 374).—This is a report of a successful attempt to preserve eggs for 13 months by subjecting them to low temperatures.

Raising Belgian hares and other rabbits, D. E. LANTZ (*U. S. Dept. Agr., Farmers' Bul.* 496, pp. 16, figs. 5).—This contains instructions both for those who wish to raise rabbits or hares chiefly for home consumption, and for those who desire to raise them for market. It discusses the history and characteristics of Belgian hares, selection of stock, hutches and pens, food and feeding, breeding, marketing, and ailments of rabbits.

Pond culture problems (*Wiener Landw. Ztg.*, 62 (1912), No. 11, pp. 123-125, fig. 1).—The cleaning, liming, and general management of fish ponds are discussed, and a number of books and articles on the subject are reviewed.

DAIRY FARMING—DAIRYING.

The feeding problem, J. B. LASSEN (*Tidsskr. Landökonomi*, 1912, No. 5, pp. 321-348).—An address discussing the various methods of determining the feed requirements of dairy cows, and the application of the feed unit system in the bookkeeping on Danish dairy farms.

Experiment with sugar-beet slices (schnitzel) as a food for milch cows, D. TURNER and C. D. STEWART (*Agr. Students' Gaz.*, n. ser., 15 (1912), No. 6, pp. 185-188).—In experiments with 6 cows, where the basal ration consisted of straw chaff, hay, Bombay cotton-seed cake, soy cake, gram, and molasses, mangolds proved to be a better feed than sugar-beet chips. The butter from the lot fed on sugar-beet chips was hard, more difficult to work, and had to

be churned at a higher temperature, but the color of the butter was much better than that from the lot fed mangolds. The beet chips seemed to have a laxative effect at first, and the cows in that lot showed greater signs of thirst than those on the mangolds. Some little time was also necessary for the cows to become accustomed to the beet-chip ration.

Dairy cattle, H. GRISDALE (*Canada Expt. Farms Rpts. 1911*, pp. 59-71).—This describes the methods of feeding the station herd, methods of making cream cheese and Coulommier cheese, and contains the records of individual cows.

Winter dairying and creameries (*Dept. Agr. and Tech. Instr. Ireland Jour.*, 12 (1912), No. 2, pp. 281-303).—This contains data on milk and butter production in Ireland.

Dairying in Denmark, 1911, B. BÖGGILD (*Tidsskr. Landökonomi*, 1912, No. 4, pp. 257-276).—This is the customary report on the conditions of Danish dairying during the year, with statistics relating to the dairying industry.

Report of the Austrian dairy committee on the condition of the dairy industry in the different crown lands, REINISCH ET AL. (*Österr. Milk. Ztg.*, 18 (1911), Nos. 11, p. 163; 13, pp. 195, 196; 18, pp. 275, 276; 23, pp. 356, 357; 24, pp. 371, 372; 19 (1912), Nos. 1, pp. 3-5; 3, pp. 37, 38; 4, pp. 50-52; 5, p. 66; 7, pp. 99, 100; 8, pp. 115-117; 9, pp. 132, 133; 10, pp. 147, 148; 11, pp. 163-165).—This contains statistical data reported by different authors on the methods of management, milk production, and related topics in Vorarlberg, Kärnten, Salzburg, Steiermark, Lower Austria, Upper Austria, Moravia, Galicia, Silesia, Carniola, and Bohemia.

Cow mortality tables (*Hoard's Dairyman*, 43 (1912), No. 18, pp. 689, 690).—An attempt to estimate the average length of life of a dairy cow, based on data contained in the Holstein-Friesian herd books.

The inheritance of milk yield in cattle, J. WILSON (*Sci. Proc. Roy. Dublin Soc.*, n. ser., 13 (1911), No. 7, pp. 89-113).—Records of Danish cows are submitted as a proof that improvement in milk yield by breeding is not a gradual process, as has been supposed, but is inherited in Mendelian fashion, that is, if a daughter is not on an approximate equality with her dam as a milk producer she is either much higher or much lower. The extreme grades are the parent strains, and the intermediate are the hybrids. Records of progeny of a few bulls are also given to bear out the same argument.

The "escutcheon:" A guide to milking merit, J. S. MCFADZEAN (*Jour. Dept. Agr. Victoria*, 9 (1911), No. 9, pp. 585-599, figs. 23).—This is an attempt to revive an old theory as advocated by Guenon. The different types of escutcheon are illustrated and described.

Testing the dairy cow, T. R. MIDDAGH (*Ohio Sta. Circ.* 122, pp. 121-134, figs. 15).—This contains advice in regard to keeping records of dairy cows, and gives directions for the use of the Babcock test with milk and skim milk.

Secretion in the mammary gland, H. HOVEN (*Anat. Anz.*, 39 (1911), No. 11-12, pp. 321-326, figs. 4; abs. in *Jour. Roy. Micros. Soc.* [London], 1912, No. 2, p. 171).—At the beginning of secretion in guinea pigs the cytoplasm of the cells contains numerous chondriosomes, forming long undulating filaments. These break into granules, some of which are transformed into secretory granules (probably becoming casein or sugar), while others are transformed into minute drops of fat.

Milk, G. B. TAYLOR (*Bien. Rpt. La. Bd. Health, 1910-11*, pp. 82-107).—Analyses and bacterial counts of milk, and other results of milk inspection, are reported.

A biometrical study of milk streptococci, J. BROADHURST (*Jour. Infect. Diseases*, 10 (1912), No. 3, pp. 272-284, figs. 4).—A study of the fermentative

reactions of different species of streptococci found in milk. The results are summarized as follows:

"Morphological characters are not correlated with fermentative powers. Milk and neutral red are not sufficiently diagnostic to aid in determining the sources of streptococci. Lactose, saccharose, salicin, raffinose, mannit, and inulin seem to have significant fermentative reactions. Saccharose, salicin, and inulin should be tested with human, bovine, and equine streptococci. The milk streptococci form a large number of groups when classified with regard to their effect upon the six test substances. The milk streptococci are characterized by unusually high fermentative powers. The incomplete data at hand indicate that the milk strains are most like the human strains; there is less likeness between the milk and the bovine strains; they show practically no resemblance to the equine strains.

"It is proposed to continue this quantitative comparison of fecal (human, bovine, and equine) and milk streptococci in these and other media, in the hope that complete quantitative comparisons will give a method of determining the source of streptococcal pollution of milk."

Silicates in milk from glass bottles, H. SCHULZ (*München. Med. Wchnschr.*, 59 (1912), No. 7, pp. 353, 354; *abs. in Clean Milk Bul.*, 1 (1912), No. 5, p. 197).—These experiments consisted of boiling modified milk in bottles of various kinds from 5 to 15 minutes. There was an increase of silicic acid in milk which had been sterilized in cheap bottles, while milk boiled in bottles made of better glass contained only a trifling amount. Momentary boiling in cheap bottles showed no acid.

Investigations on dairy bacteriology, WEIGMANN and A. WOLFF (*Milche. Zentbl.*, 41 (1912), Nos. 1, pp. 2-6; 3, pp. 65-68; 4, pp. 97-100; 5, pp. 129-134).—A report of experiments in isolating several organisms which were found to cause a bitter taste, premature coagulation, and other abnormal qualities in milk.

A milk-borne epidemic of typhoid fever, E. B. BIGELOW (*Jour. Amer. Med. Assoc.*, 57 (1911), No. 18, pp. 1418-1420).—A brief report in which the sources of outbreaks of several cases of typhoid epidemics were located by testing for the Widal reaction samples of blood from every person connected with the suspected dairies. It is maintained that the disease could be nearly eliminated if typhoid carriers were sorted out by testing specimens of blood from all persons living on dairy farms or handling food consumed without heating, and prohibiting those reacting from engaging in such occupations.

Sanitary improvement of milk supply, E. C. LEVY and T. J. STRAUCH (*Ann. Rpt. Health Dept. Richmond, Va.*, 1911, pp. 45-59, 140-143, figs. 2).—This contains a report of the work relating to milk inspection, which shows a great improvement in the quality of milk and sanitary surroundings of dairies since the inspection was begun in 1907.

[Refrigeration in the dairy industry] (*Ber. II. Internat. Kältetkong. Wien*, 2 (1910), pp. 353-367, 400-430, figs. 7).—These papers were read at the second International Refrigeration Congress, held at Vienna, October, 1910.

The effect of cold storage upon the bacteriological and chemical changes in milk and butter, C. E. MARSHALL (pp. 353-367).—This is a semipopular review of investigations at the state experiment stations in the United States and by the Dairy Division of this Department. The work is summarized as follows: "Milk and butter must be frozen to check completely the growth of microorganisms. Enzymic action probably is not completely inhibited by low temperatures and freezing, or, in other words, there may be deterioration in milk and butter even when frozen. The effect of lower temperatures than these cited herein is not determined."

The application of low temperatures to the curing and storage of Cheddar cheese, S. M. Babcock (pp. 400-414).—This is a historical résumé of investigations of refrigeration which have been of practical value in manufacturing Cheddar cheese.

Employment of refrigeration in the cheese industry, P. Guerault (pp. 415-422).—A résumé of some European methods.

The application of refrigeration in the manufacture of Roquefort cheese in Aveyron, P. Lebrou (pp. 423-430).—The details of making Roquefort cheese are described, with special reference to the influence of temperature as affecting the quality of the cheese.

Cost of making [butter], F. BALLANTYNE ET AL. (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 3, pp. 90-92).—These are estimates of practical butter makers on the cost of making butter. The figures submitted range from 1.42 to 3 cts. per pound.

Cost of making [cheese], F. BALLANTYNE ET AL. (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 3, pp. 110, 111).—This consists of statements of practical cheese makers, showing that the cost varied from 55 cts. to \$2.50 per 100 lbs. The two principal factors which influence the cost of making are the time of year and the amount of cheese made.

The manufacture of "gray" cheese in the Tyrol, J. HUSSMANN (*Milchz. Zentbl.*, 41 (1912), Nos. 2, pp. 55-58; 3, pp. 86-90).—A discussion of the management of dairy farms in the Tyrol, and the methods of making a skim milk cheese known in that region as "gray" cheese.

How to make "Jack" cheese, E. H. HAGEMANN (*Pacific Dairy Rev.*, 16 (1912), No. 12, pp. 3, 4; *N. Y. Produce and Amer. Cream.*, 34 (1912), No. 2, pp. 66, 67).—Details of making "Jack," formerly called Monterey, cheese are given.

A coating for cheese, A. FRESTADIUS (*Nord. Mejeri Tidn.*, 27 (1912), No. 14, p. 159; obs. in *N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 2, pp. 54, 55).—This is a recipe for making a new preparation for coating half-soft cheeses of the Stilton and Gorgonzola type, and which consists of vaseline, plaster of Paris, gum arabic, and salt. The vaseline is used to give it the consistency of butter, the gum arabic to make the paste pliable and adhesive, and the salt to keep it moist and soft. Vaseline and plaster of Paris, when used without the salt and gum arabic, dried up and fell to powder.

Concerning buttermilk and its derivatives, F. LEPPERRE (*Handel. Vlaamsch Natuur en Geneesk. Cong.*, 15 (1911), pp. 49-52).—Analyses of buttermilk and whey are reported.

VETERINARY MEDICINE.

Springtime surgery, edited by D. M. CAMPBELL (*Chicago*, 1912, pp. 143).—This is a collection of articles which have appeared from time to time in the *American Journal of Veterinary Medicine*, and which deal chiefly with those surgical procedures which are employed in the spring of the year.

Biological products, C. H. HIGGINS (*Amer. Vet. Rev.*, 41 (1912), No. 3, pp. 282-289).—This is a general discussion of the evolution of biological therapy. The methods of combating disease in Canada by means of serums, vaccines, etc., are described.

Report from the government veterinary surgeon for the year 1910-11, J. A. RALPH (*Rpt. Dept. Sci. and Agr. Brit. Guiana, 1910-11*, pp. 69-71).—A brief account of the work of the year.

Report of the department of animal hygiene of the Emperor William Institute for Agriculture at Bromberg, MIESSNER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg*, 3 (1911), No. 1, pp. 30-41).—This is a report of the activities of this division from 1906 to 1909, inclusive. It deals with the

results obtained with sero-diagnoses of glanders, combating tuberculosis, ag-gressin tests, preparation of vaccine against hemoglobinuria in bovines, toxicity of castor-oil seeds, septicemia pluriformis ovium, combating hemoglobinuria in bovines, beschälseuche, feeding tests (with eosin, beans, and 'sea fish'), anaphylaxis investigations, paratyphoid investigations, chemotherapeutic tests with hemoglobinuria of bovines, and examination of the samples sent to the station.

Animal diseases in Formosa. J. D. REARDON (*Philippine Agr. Rev.* [English Ed.], 5 (1912), No. 3, pp. 144-146).—It is stated that while the Prefecture of Ako, which is about 42 square miles in area, has always been more or less infested with rinderpest, on July 10, 1911, the disease broke out in a very virulent form, 2,100 cases having been diagnosed since that date.

Investigations in regard to the receptivity of fowls for anthrax, and the reason for their resistance against this disease, W. MÖLLHOFF (*Untersuchungen über die Empfänglichkeit des Geflügels für Milzbrand und über die Gründe der Resistenz des Huhnes gegen diese Krankheit. Inaug. Diss., Univ. Bern, 1910, pp. 47; abs. in Centbl. Baktr. [etc.], 1. Abt., Ref., 49 (1911), No. 6, p. 162*).—The resistance of the fowl against anthrax is considered due to the presence of bactericidal substances in the lymph or other body fluids of this animal. When anthrax bacilli are placed into the subcuticular tissue they die in a very short time, and in this way prevent a local development of the anthrax organism and protect against a generalized infection. The origin of the bactericidal substances in the lymph could not be determined. Phagocytosis seems to have no significance for this disease in fowls. The resistance of the fowl to the disease is not due to its high body temperature.

The thermoprecipitation method for diagnosing anthrax, A. CASALOTTI (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 49, pp. 882, 890*).—The thermoprecipitation test is considered a good one for diagnosing anthrax.

The Ascoli precipitin reaction for diagnosing anthrax, L. GRANUCCI (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 10 (1911), No. 6, pp. 454-470; abs. in Ztschr. Immunitätsf. u. Expt. Ther., 11, Ref., 5 (1912), No. 1, pp. 867, 868*).—The specific precipitinogen was found to develop first at the site (or path) where the virus was injected, and the amount increases as the disease progresses. It is also dependent on the number of virulent organisms present, and the affinity which the organisms have for the virus. If the bacilli are present only sparingly the precipitinogen must be looked for at the area of the body which was first attacked by the organisms. The precipitinogen will withstand a temperature of 100° C. for several minutes. It is not destroyed by putrefaction nor by allowing it to dry for a year, and not in an organ which has been preserved in alcohol for 11 years or longer. Formalin changes or destroys the precipitinogen.

The specificity of Ascoli's precipitin reaction when utilizing various organs for the diagnosis, G. RONCAGLIO (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 9 (1911), No. 6, pp. 424-432; Clin. Vet. [Milan], Russ. Pol. Sanit. e Ig., 34 (1911), No. 10, pp. 450-458; abs. in Ztschr. Immunitätsf. u. Expt. Ther., 11, Ref., 4 (1911), No. 8, pp. 405, 406*).—The Ascoli reaction (*E. S. R., 26, p. 375*) was found positive only when anthrax was present. It made very little difference whether the organs used were in a state of decomposition or fresh. The most characteristic reaction was obtained with extracts from the spleen, but the other organs, etc., also gave good results. They behaved as regards specificity in the following order: The gelatinous mass (edema) in the skin (which surrounds the injection areas of guinea pigs treated with anthrax bacilli), the heart, lungs, blood, muscle, liver, kidneys, and brain substance.

Recent investigations on the etiology of foot-and-mouth disease, J. STROEL (*Vet. Jour., 68 (1912), Nos. 440, pp. 77-82; 441, pp. 155-159*).—This is a trans-

lation of a paper presented before an assembly of Prussian government veterinarians in November, 1911, relative to investigations of the causative organism of foot-and-mouth disease (*Cytorrhycles aphtharum*). See also previous notes (E. S. R., 26, pp. 376, 682).

Foot-and-mouth disease in the Netherlands in 1911. H. REMMELTS (*Dept. Landb., Nijv. en Mandel, Verslag. en Meded. Dir. Landb. [Netherlands], 1912, No. 1, pp. 178, pls. 11, figs. 5*).—This is a detailed report on foot-and-mouth disease, of which 70,518 cases were reported during the year 1911.

The catalase contained in the milk of cows suffering from foot-and-mouth disease, H. BERTIN-SANS and E. GAUJOUX (*Hyg. Viande et Lait, 6 (1912), No. 4, pp. 193-197*).—The catalytic activity of milk obtained from animals affected with foot-and-mouth disease is increased during the first stages of the disease, but as the disease progresses catalysis becomes less and finally it turns to the normal level.

Foot-and-mouth disease in horses. D. A. DE JONG (*Tijdschr. Veeartsnijck., 38 (1911), No. 18, pp. 689, 690; abs. in Vet. Rec., 24 (1912), No. 1232, p. 514*).—While it is known that horses are somewhat susceptible to foot-and-mouth disease, cases of its transmission to them are very rare. In this paper the author records an instance of its occurrence in 3 foals, which had been weaned a few days previous to July 15, on which date they were placed in a field occupied by cattle suffering from the disease. Five days after the foals were placed in the field the first symptoms of the disease, namely, difficult prehension of food and salivation, appeared. The buccal mucous membrane showed aphthæ—some intact and others burst—at different points.

On June 30 one of the foals still showed salivation, and traces of vesicles were still clearly apparent upon the tongue and in other portions of the mucous membrane, but lesions upon other parts of the body, notably upon the feet, did not exist. These cases are thought to prove that it is insufficient in dealing with foot-and-mouth disease to confine preventive measures to ruminants and pigs.

Hoffmann's method against foot-and-mouth disease. LUCAS (*Deut. Tierärztl. Wchnschr., 20 (1912), No. 11, pp. 162-165*).—Fuguform, which is a chemical compound prepared from formaldehyde and guaiacol, was found to be a very efficient product for treating foot-and-mouth disease externally.

Immunizing horses against glanders with killed glanders bacilli (farase). A. DEDIULIN (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 9 (1911), No. 6, pp. 382-391; abs. in Berlin. Tierärztl. Wchnschr., 28 (1912), No. 11, pp. 195, 196*).—On an estate, which during harvest time works 10,000 horses, 276 succumbed to glanders. In order to determine if horses could be immunized against the disease 303 out of a group of 600 animals were treated with "farase" (E. S. R., 9, p. 887). One year and four months after the inoculation 14 of the non-immunized animals became glanderous. No cases of glanders were noted among the vaccinated horses with the mallein test, although they had been in direct contact with the unvaccinated animals throughout the entire period. In regard to the cause and the diagnosis of Malta fever, K. SAISAWA (*Ztschr. Hyg. u. Infektionskrank., 70 (1912), No. 2, pp. 177-203; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 5 (1912), No. 3, pp. 12, 13*).—The following conclusions were drawn:

(1) The causative agent of Malta fever is a bacterium which appears in the form of a short rod. The name *Bacterium melitense* is therefore to be given in reference to *Micrococcus melitensis*. (2) The bacteria grow in dextrose solutions, but best on alkaline media. (3) The bacteria possess a certain pathogenicity for rabbits and guinea pigs, the disease running the course of an acute sepsis. (4) In healthy animal and human sera, as well as sera which origi-

nate from cases of other diseases—that is, by normal agglutinins—the Malta fever bacteria are agglutinated, although their behavior toward normal agglutination depends largely upon the strain employed and the individual composition of the sera having variant agglutinability. (5) With rabbit and goat immune sera and in the sera obtained from Malta fever subjects the agglutinability of the various strains tested was very uniform. (6) The agglutinins of normal serum were inactivated by heating serum for one-half hour at 55° C., while the immune-agglutinins remained stable at this temperature. It is therefore recommended that for diagnostic purposes the serum obtained from an affected subject be heated for one-half hour at 55° C. before conducting the test. (7) With watery extracts of Malta fever bacteria a specific complement-fixing substance can be demonstrated in the serum with the aid of the complement-fixation test. (8) The opsonic index for Malta fever bacteria in the serum was in one of the cases increased.

Contribution to the diagnosis of Malta fever, J. R. MOHLER and A. EICHORN, (*Jour. Amer. Med. Assoc.*, 58 (1912), No. 15, pp. 1107-1109).—This includes a discussion of the history of Malta fever, its discovery in Texas (E. S. R., 25, p. 782), the various methods of diagnosis, and the experiments of the authors as regards the complement fixation test.

Owing to the differences of opinions which exist in regard to the agglutination test used for diagnosing this condition, the authors sought to determine the utility of the complement fixation test for this purpose. "From the results of these investigations it appears that the complement fixation test can be utilized for the diagnosis of Malta fever, and in consideration of the fact that the agglutination test is not always reliable for such purposes, the complement fixation would be of great advantage as an adjunct in the diagnosis of this malady."

A description of the complement fixation and macroscopic agglutination tests as utilized by the authors is given in detail.

Rinderpest as observed in the Philippines, W. SORRELL (*Amer. Vet. Rev.*, 41 (1912), No. 3, pp. 290-299, figs. 3).—This is a description of the disease as it is encountered in the Philippine Islands, and a discussion of the various methods utilized for combating it.

A cultural method of hyperimmunizing animals for the production of anti-rinderpest serum, F. S. H. BALDREY (*Jour. Trop. Vet. Sci.*, 6 (1911), No. 1, pp. 251-256).—This work shows "that anti-rinderpest serum can be prepared by the inoculation of virulent blood diluted with broth. It appears possible that an active toxin is produced and excreted into the broth by the rinderpest organisms contained in the virulent blood and by this means the results recorded are obtained. This material or probable toxin is rapidly excreted and so active that it appears to quickly inhibit any further growth of the rinderpest organism, destroying its virulence and finally killing it.

"The substance so obtained is very much more active than that obtained in virulent blood, so much so that it can not be given subcutaneously with safety on account of the extreme inflammatory condition it sets up. To use it as an hyperimmunizing agent, doses are better given intravenously and gradually increased so that the [injections are] spread over a period of some 2 months or more. The immune serum so obtained is powerful, but 15 to 20 per cent weaker than that made by massive injections of virulent blood. The method is an eminently practical one and shows a great financial saving."

Tests of anti-rinderpest serum, A. R. WARD and F. W. WOOD (*Philippine Agr. Rev. [English Ed.]*, 5 (1912), No. 2, pp. 75-79).—"The experiments seem to show that anti-rinderpest serum does not prevent infection with rinderpest. On the contrary, animals injected with serum and exposed to rinderpest soon

contract the disease and pass through a more or less modified attack. [It is] shown that the blood of animals is infective during this attack."

The authors point out the inadvisability of relying upon serum to prevent an attack of this disease. Such serum has been advocated by sanitarians in various parts of Africa.

Investigations in regard to tetanus curative sera prepared according to various methods with the aid of immunity reactions and animal tests, W. SCHÜRMAN and E. SONNTAG (*Ztschr. Immunitätsf. u. Expt. Ther.*, I, Orig., 12 (1911), No. 1, pp. 1-15; *abs. in Zentbl. Biochem. u. Biophys.*, 12 (1912), No. 23, p. 932).—Treating horses by subcutaneous injections of toxins, i. e., bacilli and spores, yields no agglutinins or precipitins specific for the tetanus bacillus in the blood serum. The serum obtained in protective tests with animals pre-treated with toxin behaved in the same manner. The protective action probably runs parallel with the antitoxin content of the serum. By giving killed or living bacteria intravenously to a rabbit a slight agglutinin, with a marked precipitin formation, took place.

The treatment of tetanus by magnesium sulphate, carbolic acid, and anti-tetanus serum, J. CAMUS (*Compt. Rend. Soc. Biol. [Paris]*, 72 (1912), No. 3, pp. 109-112; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, II, Ref., 5 (1912), No. 3, p. 11).—Magnesium sulphate and carbolic acid were found of no value in treating tetanus, the former having only a momentary effect upon the spasm. The serum treatment of tetanus is far better. Some tests with an antitoxic serum prepared with pepsin are also reported but the results obtained were very uncertain.

Bovine and human tuberculosis, LYDIA RABINOWITSCH (*Berlin. Klin. Wchnschr.*, 49 (1912), No. 16, pp. 752-754).—It is stated that the bovine type of bacillus causes a great many cases of tuberculosis in man. Prophylaxis must therefore not be ignored in this direction.

Tuberculosis in chickens, Y. VOSCIEN (*Hyg. Viande et Lait*, 6 (1912), No. 4, pp. 207-211).—Out of 226 chickens which were seized as being tuberculous 145 on autopsy showed lesions of tuberculosis. The tuberculous processes were distributed among the following organs: Liver, 143 cases; spleen, 135; cervical ganglion, 102; lungs, 61 (1 case of tuberculosis of lungs and trachea included); bones and articulations, 46; alimentary canal, 30; peritoneum, 13; kidneys, 9; and ovaries, 6 cases.

Tuberculosis of poultry, RAYMOND and CHRÉTIEN (*Hyg. Viande et Lait*, 6 (1912), No. 4, pp. 211-226, figs. 8).—This article includes observations made in regard to the occurrence of tuberculosis in poultry as noted at the central game market at Paris. The article is illustrated with drawings of pathological preparations. The distribution and frequency of the lesions are stated and discussed.

The tuberculin test, P. FISCHER (*Proc. Amer. Vet. Med. Assoc.*, 48 (1911), pp. 536-556).—A discussion of the nature of the tuberculin test and a detailed statement of the results obtained with it in the State of Ohio.

In regard to tuberculin anaphylaxis and its relation to the tubercula reaction, T. J. VON CAPELLE (*Zentbl. Bakt. [etc.]*, I, Abt., Orig., 60 (1911), No. 6, pp. 531-542).—Anaphylaxis can be produced with tuberculin because the tuberculo-protein contains an integrating substance upon which anaphylaxis depends. According to this the tuberculin reaction is an anaphylactic process. Anaphylaxis so produced can be conveyed from one animal to the other.

Upon the defense of the organism against infection by the tubercle bacillus, A. CALMETTE and C. GUÉRIN (*Ann. Inst. Pasteur*, 25 (1911), No. 9, pp. 625-641).—The serum of bovines which were hyperimmunized by repeated injections of modified (in media of ox bile) tubercle bacilli, when injected into guinea pigs, will not prevent or cure tuberculosis in these animals. When given with

attenuated or virulent bacteria it stimulates a rapid evolution of the pathological lesions in the animals. If the serum is used in large doses it may retard the pathological process, but on the other hand it will have a tendency to favor the elimination of tubercle bacilli through the regular excretory channel.

The intradermal tuberculin test, D. F. LUCKEY (*Amer. Vet. Rev.*, 41 (1912), No. 3, pp. 316-323).—The intradermal test in the hands of this author gave good results, in fact, results somewhat better than those obtained by the old subcutaneous method. The method of making the test is described. The author also points out the value of keeping a history of the animals in the vicinity.

Diagnosis of pulmonary tuberculosis with regard to the new sanitary laws, O. MÜLLER (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 17, pp. 293-295, figs. 2).—This is a description of the Königsberg method devised by Müller, Jonske, and Wiemann for diagnosing tuberculosis. This is a modification of the method of Scharr and Opalka (*E. S. R.*, 26, p. 679), but is supposed to possess certain advantages which are described in detail. The author recommends giving an injection of cocaine at the point where the cannula is to be inserted 15 minutes before the operation. Reasons for not using the Rautmann and the Tallgren and Graae apparatus are given.

Sputum gathering methods for diagnosing tuberculosis in bovines, H. RAUTMANN (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 19, pp. 335-337).—This is a polemic in regard to Müller's method (see above) for obtaining sputum. The author also discusses the value of his own apparatus, which is a modification of the Tallgren and Graae apparatus (*E. S. R.*, 24, p. 84).

Preliminary report upon the injection of rabbits with protein-free (tuberculo) antigen and antigen-serum mixture, A. H. CAULFIELD (*Proc. Roy. Soc. [London]*, Ser. B, 84 (1911), No. B 573, pp. 390-394).—This work is summarized as follows:

"The injection of rabbits with a saline dilution of an alcohol-ether extract of tubercle bacilli is capable of producing complement-fixation bodies to that antigen. The digestion at 37.5° C. of the alcohol-ether extract with inhibitive serum (human) for various intervals up to 1 hour does not affect the production of the specific sensitizers. The digestion at 37.5° of the alcohol-ether extract with fixation-positive serum (rabbit) for 1 hour inhibits the production of specific sensitizers. . . .

"The injection of 'bacillen-emulsion' in 2, 1.5, 0.5, and 0.005 mg. amounts failed to induce fixation bodies. The injection of 100 mg. of partially dried dead tubercle bacilli (after alcohol-ether extraction) produced after the first injection sensitizers, so that 0.1 cc. serum caused complete fixation although the injection of 0.5 mg. failed to do this. . . .

"The rabbit's blood was obtained by puncture of the ear vein and withdrawal by a 2 cc. record syringe. This has been found to be the most rapid and satisfactory method of obtaining up to 5 cc. of blood. The needle and syringe are sterilized in hot oil, the needle being then well cleared in cold sterile saline."

The results obtained in the eradication of tuberculosis from a herd by the use of tuberculosis vaccine and the Bang system, S. H. GILLILAND (*Ann. Rpt. Penn. Dept. Agr.*, 16 (1910), pp. 166-179; *Proc. Amer. Vet. Med. Assoc.*, 43 (1911), pp. 477-492).—This is the report of a series of experiments made for the purpose of eradicating tuberculosis from a herd, which originally consisted of 200 animals, comprising Holsteins, Guernseys and grades, on the basis of the tuberculin test and the Bang method.

In 1904, when the tests were begun, 160 animals, which constituted the milking herd, were tested and showed 2 reactors, or 23.2 per cent. Nearly all of the reacting animals were in various periods of gestation and kept in separate

barns for the purpose of obtaining their offspring. The main milking herd was then distributed among four separate disinfected barns, which held from 12 to 48 animals each. In the majority of cases the milking animals were tested every 6 months until 2 negative tests were obtained and then yearly thereafter. Calves intended for future introduction into the milking herd were immunized with human tubercle bacilli intravenously injected. All new cows purchased were placed in quarantine 150 ft. from the main barns.

In the spring of 1905 the milking herd, which then consisted of 120 animals, was again tested and showed 13, or 10.8 per cent, of reactors. Five months later (November, 1905), out of 136 animals 7, or 5.1 per cent, reacted. In April, 1906, 150 animals were tested and of these 13, or 8.4 per cent, reacted, and in the following November out of 137 animals tested 5, or 3.6, per cent, gave the test. In April, 1907, 201 animals and in October of the same year 137 animals were tested, but no reactions were found. During 1908, in the months of April and November, 145 and 169 animals, respectively, were examined. In the first case the reactors present amounted to 1.4 per cent and in the latter to 1.8 per cent, which shows a reinfection of the herd. In April, 1908, no reactors were present in the herd, but about a year after this, out of a herd of 151 animals, 5 animals or 3.7 per cent reacted. The author accounts for the reinfection of the herd the second time as due to the fact that 2 valuable animals which reacted in November, 1908, were retained in the herd for a retest. "The history and cycle of the tuberculin test for these 2 animals and a few others are dealt with in detail in the original.

"[In the vaccination experiments which were conducted] since 1904 there were 184 calves vaccinated, of which 46 are in the main milking herd at the present time. Of the 143 animals that were sold for breeding purposes, for beef, or that died from lung worms, etc., post-mortem examinations were obtained on approximately 100 head and no lesions of tuberculosis were found in any except those aforementioned following the tuberculin test of 1911."

The vaccine used was made from the human type of tubercle bacillus, which was never more than 36 hours old.

Report on an experiment to produce a tolerance in cows to tubercle bacilli after injection of various products, A. J. SMITH and H. FOX (*Ann. Rpt. Comr. Health Penn.*, 4 (1909), pt. 1, pp. 251-268).—In these experiments 8 definitely tubercular cows, 2 which were highly suspicious, and 2 which were almost certainly free from the disease were used. The latter 2 animals served as controls, and one received no vaccine. All of the rest of the animals were given a pretreatment with tubercle bacilli in order to determine their degree of resistance toward the products. The products injected, either under the skin or intravenously, in the experiments proper were made from dead degreased tubercle bacilli used in a standardized emulsion and a salt solution extract of living tubercle bacilli in which the fat had been softened with ether.

After giving the clinical autopsical and microscopical findings the authors show that none of the above animals lived long enough to overcome the acute effects of injecting a large number of bacteria into the circulation. The animals which had tuberculosis before beginning the experiment, particularly those where the lesions were more retrogressive, stood the injections better and showed a more increased tissue resistance than those which were markedly tubercular and the remainder which had only slight lesions or none at all. The animals with active lesions are not able to accommodate much extra toxin or to stimulate to any great extent the power of antibody formation.

An active immunity is therefore very difficult to attain. The methods employed here seem only to increase the power of the tissues to passive resistance.

Combating tuberculosis in female animals, E. VAN HUFFELEN (*Handel. Vlaamsch Natuur en Geneesk. Cong.*, 14 (1910), pp. 250-257).—This article deals in a general way with the prevalence of tuberculosis in female animals, chiefly cows in the Netherlands, and gives an exposition of the methods in vogue in that country for combating the disease.

Acid agglutination of bacteria, M. BENIASCH (*Ztschr. Immunitätsf. u. Expt. Ther.*, I, Orig., 12 (1912), No. 3, pp. 268-315; *Jour. Amer. Med. Assoc.*, 57 (1911), No. 25, pp. 1998, 1999; abs. in *Chem. Abs.*, 6 (1912), No. 7, p. 887).—"This acid agglutination of bacteria is, if anything, more sharply specific than is agglutination by immune serums. Typhoid bacilli can be distinguished from the various strains of paratyphoid and colon bacilli with the greatest ease, and bacilli so closely related that it is difficult or impossible to distinguish them by serum agglutination are readily identified by the optimum hydrogen ion concentration of their agglutination by acids. With various strains of typhoid bacilli the agglutinability by acids and serums runs parallel, and so it seems probable that the antisera and the acids act on the same constituent of the bacteria."

The acid agglutination of the bacteria of the paratyphoid group, POPPE (*Ztschr. Immunitätsf. u. Expt. Ther.*, I, Orig., 13 (1912), No. 2, pp. 185-191).—The Michaelis method can be employed for identifying the bacteria representing the paratyphoid group. A differentiation of some of the lower forms in this group was not possible.

The nature and treatment of bovine piroplasmosis in Germany, H. MIESNER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg*, 3 (1911), No. 4, pp. 207-230).—This paper consists largely of discussions of the vaccination and chemotherapeutic treatment of Texas fever. A bibliography of 23 titles is appended.

Agglutination reactions during the process of hog cholera serum production, W. GILTNER (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 60 (1911), No. 6, pp. 552-559).—Previously noted from another source (*E. S. R.*, 26, p. 785).

Study of the *Bacillus erysipelas suis* (*Rhusiopathia suum*), H. THUM (*Rev. in Vet. Jour.*, 68 (1912), No. 443, pp. 301-304).—A general account, which is stated to be founded on practical experience.

In regard to the cause of equine influenza, J. BASSÉT (*Rec. Méd. Vét.*, 83 (1911), No. 17, pp. 546-552, fig. 3).—A detailed statement in regard to this work, which has already been noted (*E. S. R.*, 26, p. 334).

Concerning *Ascaris megaloccephala*, W. GREIM (*Über Ascaris Megaloccephala. Inaug. Diss., Univ. Giessen, 1910; abs. in Berlin. Tierärztl. Wchnschr.*, 23 (1912), No. 8, p. 141; *Vet. Rec.*, 24 (1912), No. 1236, p. 532).—The following are the conclusions drawn from the study of this parasite:

"The presence of *A. megaloccephala* may induce symptoms of disease in the horse. The *Ascaris* irritates the intestinal mucous membrane by its movements. By the aid of its lip apparatus, it scratches the mucous membrane and produces small wounds. Such lesions, when numerous and situated in close proximity to one another, may lead to inflammation, ulceration, and necrotic destruction of small portions of the mucous membrane. By its individual strength the *Ascaris* can not perforate the intestine. The parasites live free in the lumen of the intestine; and, contrary to the views repeatedly expressed hitherto, they are not able to suck from or to hook on to the intestinal mucous membrane. The *Ascaris* contains toxin in its body, and disperses it into its surroundings. The effects of the toxin consist of local irritation, alteration of the nervous system, and toxic action upon the heart and blood. An affection of the kidneys in connection with the excretion of the toxin can not be demon-

strated. The pathogenic importance of the parasite renders it necessary to administer anthelmintics to the horses infected with it."

Investigations of the action of "606" on spirochetosis of fowls, A. HAUER (*Centbl. Bakt. [etc.], I. Abt., Orig.*, 62 (1912), No. 6, pp. 477-496).—The author finds that Salvarsan destroys spirochetes in fowls, its curative action being noticed as early as the day of administration. A bibliography of 31 titles is appended.

RURAL ENGINEERING.

The primer of hydraulics, F. A. SMITH (*Chicago*, 1911, pp. VI+217, figs. 108).—This publication covers the more important mathematical, physical, and mechanical principles underlying the subject of hydraulics, and gives general information, formulas, and hydraulic tables to solve problems relating to the flow of water in channels in municipal, drainage, irrigation, or other hydraulic works.

Tables for converting discharge in second-feet per square mile into run-off in depth in inches and discharge in second-feet into run-off in acre-feet (*U. S. Geol. Survey*, 1910, pp. 21).

A review of masonry dam design and construction illustrated with cross sections of 40 notable dams (*Engin. and Contract.*, 37 (1912), No. 21, pp. 583-594, figs. 47).—Brief descriptions of the design and construction of these irrigation and power dams are given with statements of cost.

Fourth biennial report of the state engineer and of the Carey Land Act Board of the State of Montana, 1909-10, J. W. WADE (*Bien. Rpt. State Engin. Mont.*, 4 (1909-10), pp. 18).—This report makes a brief statement of work by the Montana state engineer's office in 1909-10, and discusses the physical and financial condition of irrigation projects under the Carey Act in Montana in 1910.

Tenth biennial report of the state engineer of Wyoming, 1909-10, C. T. JOHNSTON (*Bien. Rpt. State Engin. Wyo.*, 10 (1909-10), pp. 211, pls. 2, fig. 1).—This report deals with the irrigation administration in Wyoming in 1909-10, gives lists of permits to appropriate irrigation water, tables of stream gagings, reports of superintendents of water divisions, and reports of the progress of reclamation works in the State.

Review of irrigation in India in 1909-10, W. B. GORDON (*Sup. Gaz. India*, 1911, June 10, pp. 1099-1121).—Tabulated data are reported showing the financial and other results of irrigation works in operation in India in 1909-10. The total area irrigated was about 22,500,000 acres, and the value of the crops raised thereon is estimated at about 116 per cent of the capital outlay.

Volume of water required in irrigation, M. RINGELMANN (*Rev. Hort. [Paris]*, 84 (1912), No. 7, pp. 160-162).—It is stated in this article that the soil characteristics, the nature and age of the vegetation, and existing meteorological conditions largely govern the amount and frequency of irrigation required. The results of observations along these lines are given from different sources.

The use of slope-stake tables in irrigation work, R. C. PIERCE (*Engin. News*, 67 (1912), No. 21, pp. 986, 987).—The author explains the use of tables giving the distances out to the cut and fill stakes and the corresponding cuts in cross-sectioning irrigation ditches. The process, he claims, eliminates the errors in the mental calculations of the rodman and tapeman, reduces talking and signaling to a minimum, and saves time.

[An irrigation pumping plant], C. R. SESSIONS (*Pacific Rural Press*, 83 (1912), No. 20, p. 467, fig. 1).—A simple and economical irrigation pumping

outfit is described, consisting essentially of a 15-in. centrifugal pump directly connected to a single cylinder 30-horsepower distillate engine. The plant cost, completely installed, \$1,800, has a capacity of 6,500 gal. per minute, and it is claimed can irrigate about 10 acres of land in a 12-hour run.

Automatic hydraulic pumping engine (*Northwest Hort.*, 25 (1914), No. 3, pp. 129, 130).—An improved type of hydraulic ram is described, which, it is claimed, can be operated in larger units and under a larger range of conditions than the old type, and develops under ordinary working conditions from 75 to 95 per cent of efficiency. The following improvements are suggested for insuring high efficiency: A large waterway area through the valves, approximately equal to the area of the supply pipe, a small valve movement (maximum 1 in.), valves smoothly curved for easy passage of the water, close relative position of waste and discharge valves, eliminating the column of dead water to be started and stopped at each stroke, and the downward discharge using all available head.

Practical methods of draining irrigated lands, R. A. HART (*Nat. Land and Irrig. Jour.*, 5 (1912), No. 4, pp. 8-11, figs. 7).—Attention is called to the frequent importance of draining irrigated lands, and the methods of construction of open canal and covered tile drains applicable to the existing conditions in irrigated sections are briefly outlined. Special attention is paid to covered tile drains, of which 3 systems are discussed—the natural system, gridiron system, and intercepting system. A number of typical examples of tile drainage of irrigated lands are given, pointing out the special features. A cost of from \$10 to \$30 per acre, with an average of \$15 per acre, is claimed.

Irregular channels retard the flow of water, M. E. BIGGS (*Nat. Land and Irrig. Jour.*, 5 (1912), No. 5, p. 31, figs. 2).—It is pointed out that a correct drainage ditch is obtained only when dug in a manner which will not disturb the earth in the banks or bottom, and with sufficient berm and side slopes to prevent slipping and caving of banks and waste banks when under water action.

Tile drainage, J. A. JEFFERY (*Michigan Sta. Spec. Bul.* 56, pp. 45, figs. 31).—This bulletin explains the working principles of tile drainage, discusses the general planning and location, with special reference to silt basins, and points out the benefits of tile drainage. The use of the drainage level and of simple leveling devices for establishing grades is explained and the entire procedure of making and mapping the survey and of making the necessary computations for a tile drainage system is outlined, with examples of notes and profiles. The process of constructing a tile drain is outlined in detail.

New York state highways (*Municipal Jour.*, 32 (1912), No. 20, pp. 739-747, figs. 16).—This article deals with the organization of the New York State Highway Commission, road maintenance, types of road construction, and road details and specifications, and discusses recent typical road construction work.

Portland cement concrete roads, L. W. PAGE (*Engin. Rec.*, 65 (1912), No. 21, pp. 578, 579).—This is a paper read before the American Association of Portland Cement Manufacturers, May 9, in which general suggestions are given relative to the construction of concrete roads and pavements. The advantages of concrete for roads and pavements pointed out are its ability to resist shear, to transmit normal pressure over a large area of subgrade, and to act as an arch to sustain normal pressure.

The storage of Portland cement (*Irrig. Age*, 27 (1912), No. 6, pp. 215, 216, figs. 2).—Attention is called to the importance of carefully storing Portland cement for protection against moisture, and methods of construction of temporary and permanent storage buildings are briefly outlined.

Agricultural machines, K. WALTHER (*Die landwirtschaftlichen Maschinen*, Leipzig, 1910, vol. 2, pp. 120, figs. 64; 1911, vol. 3, pp. 156, pl. 1, figs. 91).—These are the second and third volumes of this series, the first having been previously noted (E. S. R., 21, p. 186).

They treat of harvesting machinery and machinery for the cleaning, storing, preparing for use, etc., of the different crops after harvesting, describing the construction and methods of operation of mowing machines, binders, hay rakes, tedders and loaders, potato and turnip diggers, threshing machines, grain cleaning and sorting machines, hay presses, and feed preparing machines. There is also included a chapter on agricultural motors.

Agricultural machinery, G. COUPAN (*Bul. Soc. Agr. France*, 1912, Apr. 15, pp. 404-413; May 1, pp. 457-461, figs. 7).—Several agricultural machines are briefly described, among which are ground and crop cultivators, tractors, drills, and harvesters. The mechanical theories for some types of potato diggers and drills are illustrated and explained.

The efficiency of the farm tractor, R. BERESFORD (*Iowa Agr.*, 12 (1912), No. 7, pp. 12-14, figs. 2).—The author computes the cost of plowing by gas tractor at 40 cts. per acre, and by horses at 60 cts. per acre. He calls attention to a number of cases where gas tractors have proved efficient and profitable on farms.

[A 24-hour test of a tractor] (*Impl. and Mach. Rev.*, 37 (1912), No. 444; pp. 1573, 1574).—A 24-hour test was made of a 50-brake horsepower, 4-cylinder, 3-speed motor in plowing and pressing, the implements employed being a 4-furrow plow and a 36-in. 5-wheel land presser.

The results show that 20 acres 89 sq. yds. of land were plowed and pressed in 24 hours. The amount of gasoline used was 69½ gal., or about 3½ gal. per acre, and the amount of lubricating oil used 1½ pt. per acre. The opinion is presented that a light, powerful, speedy tractor, drawing a comparatively small plow, is more efficient than a slower, heavier machine, pulling a greater number of plows.

An effective stumping machine (*Queensland Agr. Jour.*, 28 (1912), No. 4, pp. 290-292, figs. 2).—A stump puller and its method of operation are described. It consists essentially of an iron and wood frame supporting a wooden drum or roller which revolves by lever action and operates a block and tackle and steel cable pulling system. An illustration is given showing the working parts in detail.

[Trials of corn and seed drills] (*Impl. and Mach. Rev.*, 38 (1912), No. 445, pp. 70-74, figs. 9).—The method and results of tests on several makes of corn and seed drills for accuracy, even distribution of seed, simplicity, and general efficiency are given with the constructive details and the price of each machine.

Milking with machines (*Wiener Landw. Ztg.*, 62 (1912), No. 27, pp. 339, 340).—A discussion is given of the relative merits of suction and pressure milking machines, the advantages of light weight, simplicity, ease of adjustment, and speed in milking being conceded to the suction machines, and the advantages of steady and systematic action, easy control, ready cleaning and airing, complete milking, and easiness on the cow to the pressure machines. Several different makes of these two machines are described.

Farm power, L. W. CHASE (*Deseret Farmer*, 7 (1912), No. 28, p. 651, fig. 1).—Results of tests conducted at the University of Nebraska on gasoline engines, showing the gasoline consumed in different kinds of farm work, are reported.

From these tests and other computations it is estimated that 1 gal. of gasoline in a 3-horsepower engine will complete any one of the following operations:

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Pump 2,454 gal. of water from a 43-ft. well, shell 264 bu. of corn, grind 48.6 bu. of corn, separate the milk from 300 cows, do 20 weekly washings, grind 20 sickles, or operate the machinery in harvesting 4 acres of grain.

Power that is needed (*Farm Machinery*, 1912, No. 1074, p. 15).—Data are given from actual tests of gasoline engines showing the power required for driving the different machinery about the farm.

[Generation of electricity by wind power in Denmark], V. MAGERSTEIN (*Monatsh. Landw.*, 4 (1911), No. 2, pp. 35-40, figs. 3).—Attention is called to the use of wind power for generating electrical energy for farm use, and a brief description and discussion of private and central plants are given with a short statement of cost.

What electricity means to the farmer, P. A. BATES (*Nat. Land. and Irrig. Jour.*, 5 (1912), No. 5, pp. 79, figs. 5).—This article deals with the use of electricity on the farm, pointing out the advantages of immediate availability, adaptability, simplicity, economy, and reliability, and comparing farm work as done by electricity and as done by the old hand methods.

Electric light for the farm, N. H. SCHNEIDER (*New York and London*, 1911, pp. IX+85+VIII+86, figs. 65).—This work consists of two parts.

Part 1 contains practical information on small, low-voltage electric light plants, operated by storage batteries, suitable for farms, isolated houses, and country homes in general, explaining in detail how to estimate the size and number of lights required, their best location, and the most convenient means of control, and how to estimate the required capacity of, install, and operate the plant necessary to furnish the electric current. Part 2 deals with the wiring of houses for electric lights, with special reference to low-voltage battery systems, giving information on planning and installing the general wiring, installing the lights, switches, etc., methods of wiring for special buildings and to suit unusual conditions, and the general estimating of wiring material required. A chapter is included describing some typical plants.

Lighting system for the farm (*Farmer*, 31 (1912), No. 19, pp. 686, 688, figs. 2).—A description is given of the various modern systems used for supplying artificial light to the farm home, viz, acetylene gas, gasoline gas, electricity, blaugas, and improved lamp systems.

The electric system is considered the most efficient, although it has the highest initial cost. The following approximate costs are given for average-sized installations of each system: Acetylene gas \$250, gasoline gas \$100 and up, electricity from \$350 to \$450, and blaugas from \$100 to \$200.

Lighting with alcohol and kerosene, R. M. WEST (*Minnesota Sta. Bul.* 126, pp. 97-127, figs. 4).—The work outlined in this bulletin is primarily intended to determine the relative lighting values of industrial alcohol and kerosene, and in connection with this many factors of secondary importance are considered, such as safety, health, eyesight, cleanliness, cost of maintenance, original cost of lamp, and ease of manipulation. Five portable lamps, including both the mantle and wick types, and 1 lamp intended especially for alcohol, were selected for comparison and when possible both alcohol and kerosene were burned in the same lamp with the same mantle. The method of light measurements employed was the comparison of the lights with the light of a standard English candle by means of an open-bar photometer.

Tabulated results of these tests are given and are graphically represented by 6 sets of curves showing the ratio of the candlepower of the light to the candlepower hours per gallon of fuel. A seventh set of curves estimates the number of candlepower hours obtainable for \$1 in the case of the common illuminants and shows that with kerosene at 6½ cts. per gallon a 16 candlepower light may

be maintained giving 17,000 candlepower hours for \$1, while in order to give the same economy, alcohol would have to sell at from 3 to 5½ cts. per gallon, gas at about 50 cts. per 1,000 cu. ft., and electricity at 9 cts. per kilowatt hour.

The conclusions drawn are that with all lamps tested, the greatest amount of light per unit of fuel is obtained at the maximum candlepower which the light will give; kerosene is uneconomical and inefficient when burned in the old-style lamp; mantle lamps for either fuel are efficient but require greater care in manipulation; with each fuel burned in the lamp best suited to its use, kerosene has the higher efficiency; the lighting value of alcohol is approximately one-half that of kerosene when both are burned in the same lamp under the same mantle; and alcohol burned in the special alcohol lamp gives only a slightly lower efficiency than kerosene in mantle lamps.

As regards the further improvement of lighting apparatus, it is predicted that while the absolute amount of light obtainable with these fuels may be materially increased, it is doubtful if their relative lighting values will be greatly affected.

Plumbing for the farm home (*Farmer*, 31 (1912), No. 19, pp. 688, figs. 3).—Systems of plumbing and sewage disposal for the farm home are dealt with, a cheap and simple system of sewage disposal by septic tank and filter beds being described, which, it is stated, would cost about \$60.

RURAL ECONOMICS.

Cooperation in the South, F. G. MINER (*Farmers' Rev.*, 44 (1912), No. 19, p. 4, figs. 2).—This article illustrates the principles of cooperation among farmers by showing what a cooperative organization of truck growers near Norfolk, Va., has done for its members in a financial way within the last few years. The organization has found it to be more advantageous to have all buyers come to its stations, where the products are sold f. o. b. than to ship direct to commercial firms. They have a shipping inspector and the inspection he gives is accepted as bona fide by the purchasers.

In addition to buying and selling for its members, the association loans money to them upon certain conditions.

Grange cooperation at work: How fire insurance companies and national banks are run by farmers, J. ALVIN (*Country Gent.*, 77 (1912), No. 20, pp. 4, 5, 29, fig. 1).—This article points out by a number of illustrations how fire insurance and banking both come within the scope of grange cooperation in Pennsylvania. Of the 200 or more mutual insurance companies in the State, 18 are carrying risks of over \$60,000,000 and are managed entirely by members of the grange.

Under the plan in operation when a members applies for insurance, an officer of the company examines his property and estimates its value. Should it be worth \$1,500, for example, insurance is granted to the amount of \$1,000, on giving a note for \$50 and paying a 5 per cent assessment thereon, or \$2.50. All other assessments are made annually as they may be needed to meet the losses. At the end of 5 years, the note, which is called a premium note and is the basis of the company's resources, is returned.

The principal advantage of such insurance is in the elimination of the overhead charge which is usually the largest item of insurance cost. For instance, one mutual fire insurance company carried risks in 1911 of over \$500,000 and the total expenses amounted to only \$51.99. Another company was carrying, on January 1, 1912, insurance to the amount of \$11,716,079, and the average expense per year for the last 37 years is shown to have been \$1,641.31 and

the average cost of insurance per \$1,000 for 1 year \$1.90. Still another company is carrying \$4,139,950 of insurance and its annual expenses, including salaries and all items, are less than \$2,600.

Data as to the work and success of a number of other insurance companies, together with that of the grange banks, are given.

The cost of production of farm crops, F. W. Gist (*Proc. Middle Tenn. Farmers' Inst.*, 10 (1911), pp. 81-90).—An address delivered at the tenth annual session of the middle Tennessee Farmers' Institute, Nashville, Tenn., December 5-7, 1911, in which the author discusses and points out in detail, as a result of his investigations, some conclusions as to what ought to be included in the cost of production as it relates to the business of farming.

A rural survey in Missouri (*New York* [1912], pp. 42, figs. 22).—This pamphlet presents the results of a social and economic survey made by the Department of Church and Country Life of the Board of Home Missions of the Presbyterian Church. It includes Adair, Sullivan, and Knox counties, Missouri, comprising a total area of 1,719 square miles with a population of 53,701. Detailed information is reported for each township as to its topography, economic conditions, population, and educational, social, and religious conditions and activities.

Of the total population, 35,495 live in the country, 5,551 in 23 villages under 750 in population, and the remaining 12,655 in towns of more than 750 population. The population in the rural districts shows a decrease, while that in townships has increased, but the total population of the three counties is 1,788 less in 1910 than in 1900. The reasons assigned for this condition are (1) smaller families, (2) the increased use of farm machinery, lessening the need of farm hands, (3) the increased value of land, which has induced some farmers (as a rule the owners of the small farm) to sell out and go to cheaper lands in the West, and (4) the fact that the younger generation has been seeking greater opportunities in towns and in the cheaper lands elsewhere.

About 85 per cent of the farmers own the farms they operate, the remainder being tenants. Agricultural laborers receive from \$20 to \$30 and "keep" per month. The average family is shown to spend annually \$771 on itself, \$13.72 on its school, \$6 on its roads, and \$3.18 on its church. It is stated that only 29 per cent of the total population belong to a church, and that 44 per cent of the tenants, 78 per cent of the hired men, 65 per cent of farmers who own 20 acres of land, 46 per cent of farmers with 40 acres, 36 per cent with 60 acres, 27 per cent with 100 acres, 20 per cent with 200 acres, and 18 per cent with 500 acres do not attend. The question is raised whether the poor man does not want to go to church or whether the church makes no effort to get him to do so.

[Agricultural production in Victoria], A. M. LAUGHTON (*Victorian Year-book*, 31 (1910-11), pp. 623-707).—Notes, statistics, and detailed accounts of agricultural production of the State for 1910-11, with comparisons with former years and with other States and countries, are here presented, together with a brief summary of the work in progress at the agricultural schools, colleges, and experiment stations.

It is noted that the number of persons engaged in agricultural pursuits in 1901 was 78,539 males and 17,381 females, and that the persons employed in farming, dairying, and pastoral holdings in 1910 numbered 99,948 males and 54,083 females, the total population being 651,093 males and 656,305 females. The prevalent rates of wages paid (with rations) during 1910-11 were: Plowmen 25s. per week, farm laborers 20s., milkers 20s., harvest hands 6s. per day, and threshing machine hands 8d. per hour. The area under the 5 principal

crops, their production, and the proportion of each to the population are shown in the following table:

Area, production, and average per head of population of the 5 principal crops in Victoria, 1901 and 1911.

Crops.	Area.		Production.		Average production per head of population.	
	1901	1911	1901	1911	1901	1911
	<i>Acres.</i>	<i>Acres.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>
Wheat.....	2,017,321	2,338,089	17,847,321	34,813,019	14.91	26.63
Oats.....	362,689	392,681	9,582,332	9,699,127	8.00	7.42
Barley.....	58,853	52,687	1,215,478	1,340,387	1.02	1.03
			<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Potatoes.....	38,477	62,904	123,129	163,312	0.10	0.13
Hay.....	802,105	832,669	677,757	1,292,410	.57	.99

The number of dairy cows is shown to have increased from 515,179 in 1903 to 668,777 in 1910, the production of butter from 46,685,727 lbs. to 70,603,787 lbs. and the number of cream separators in use from 8,986 to 27,307. The Victorian wool clip for the year from sheep amounted to 73,559,226 lbs., from lambs to 6,115,044 lbs. During 1910 there were exported to foreign countries 164,213,073 lbs. of wool, of which 76,068,574 lbs. had been imported from other States.

Agriculture [in New Zealand], M. FRASER (*New Zeal. Off. Yearbook 1911*, pp. 551-565).—Notes and statistics showing the land in cultivation and acreage under various crops with their yields are here presented. The area under wheat in 1911 was 322,167 acres, oats 302,827 acres, with the average yield 25.73 bu. and 33.41 bu., respectively, per acre.

Agriculture in New Zealand, M. MURPHY (*New Zeal. Off. Yearbook 1911*, pp. 785-815).—A résumé of agricultural conditions in New Zealand for 1911, showing the acreage production of a number of crops, growth of the live stock and dairying industries, and the farming outlook of the Dominion in general (E. S. R., 25, p. 391).

[Papers on Danish agriculture] (*Tidsskr. Landøkonomi*, 1911, Nos. 7, pp. 457-470; 8, pp. 521-538; 9, pp. 569-586, 587-602; 12, pp. 681-704; 13, pp. 737-749).—The usual summaries and reviews of the main branches of Danish agriculture are here presented. Particular attention may be directed to the following: Horse Raising, by J. Jensen (pp. 457-470); Animal Husbandry, by A. Appel (pp. 521-538, 587-602); Agricultural Crops, by K. Hansen (pp. 569-586); Agricultural Imports and Exports, by N. C. Christensen (pp. 681-704); and Butter Exports 1910-11, by B. Büggild (pp. 737-749).

Agriculture and forestry [in Austria] (*Österr. Statist. Handb.*, 29 (1910), pp. 120-147).—Official statistics are presented regarding agriculture and forestry in Austria, showing in particular the basis of land taxation and the influence it has on the different types of farming, for example, the effect it has upon the acreage in field crops, meadows, pasture lands, gardens, vineyards, etc.

[Agricultural statistics in Japan] (*Statist. Rpt. Dept. Agr. and Com. Japan*, 27 (1912), pp. 1-108).—A statistical report, showing the area, production, yield, etc., of all kinds of farm crops in Japan, and how they are distributed, together with data as to poultry, eggs, live stock, and other farm activities of the country (E. S. R., 24, p. 493).

Wholesale prices in Canada, S. F. CULVER (*Daily Cons. and Trade Rpts.* [U. S.], 15 (1912), No. 115, pp. 618, 619).—This report brings out the fact that wholesale prices in Canada reached during 1911 a general level higher than in any previous year within the present generation. The prices of grains and fodder increased 5.8 per cent over 1910, fish 1.5 per cent, and other foods 11.8 per cent, although the prices of animals and meats decreased 10.2 per cent and dairy products 0.9 per cent. This decline is attributed to feed shortage. Imported foods, including sugar, were decidedly higher. Potatoes sold at \$1.24 a bushel, compared with 58.3 cents in 1910. Prices of flour and apples were lower while peaches and pears were higher than in 1910.

Prices and wages in India (*Prices and Wages India*, 28 (1911), pp. VI-230).—Tabular statements giving details as to average annual retail prices of the leading crops and the prices of staple articles of import and export in 1873 and from 1886 to 1911 in British India, together with statements as to average monthly wages of skilled and unskilled labor at the end of 1873 and of each year since 1886.

Crop Reporter (U. S. Dept. Agr., Bur. Statis. Crop Reporter, 14 (1912), No. 5, pp. 33-40, figs. 2).—Tables and notes are given showing cotton acreage and yield per acre in 1911, by States; crop conditions May 1, 1912, with comparisons; the mean dates when the planting of specified crops begins, is most general, and ends, by States; farm value of important products on particular dates, by States; production, marketings, variation in prices of eggs, and averages paid to producers in the United States; causes and extent of cotton damage, 1909-1911; mileage operated by railroads making organized efforts to promote agriculture; monthly receipts and stocks of eggs and poultry in the United States; range of prices of agricultural products at important markets; condition in terms of prospective yield per acre of a number of crops, based upon averages for the five years, 1906-1910; and temperature and precipitation statistics.

It is noted that 30 per cent of the farmers of the corn area of the United States tested their seed corn with an average germination of 85.2 per cent.

AGRICULTURAL EDUCATION.

How the States may aid their farmers, A. C. TRUE (*Country Gent.*, 77 (1912), No. 18, p. 6).—The varied functions performed by state departments of agriculture are briefly mentioned, and their functions under an ideal system of state government are discussed. According to this system state departments of agriculture would be considered as branches of state governments the fundamental business of which would be the execution of the laws relating to agriculture, involving, for example, the control of fertilizers; feeding stuffs, plant and animal diseases, injurious insects, management of state forests, fairs, etc. It should also be their business to provide a method for the regular collection and dissemination of economic data relating to agriculture and rural communities, by thoroughly trained statisticians and economists. They should be relieved of responsibility for farmers' institutes and other forms of educational extension, as well as for research work, which are lines of work more properly belonging to the agricultural colleges and experiment stations, and, in turn, these latter institutions should be freed from police duties and other administrative functions. "The great lines of cleavage for the experiment stations, agricultural colleges, and state departments of agriculture are indicated by the terms research, education, and administration," but in each State there should be worked out a system of coordination and cooperation among all public agencies for the advancement of agriculture.

[Agricultural instruction in general, and its adaptation, particularly of rural primary instruction, to the agricultural population of the country].

A. C. LE COCQ (*Rev. Agron. [Portugal]*, 9 (1911), No. 1-6, pp. 44-94).—In this article the author discusses the attributes, utility, and special features of agricultural education. He concludes (1) that in a general way the essential aim of this instruction should be to prepare and adapt the agricultural population of the country to the rural life and to the successful development of the agricultural industry; (2) that it should comprise rural elementary, professional, technical, and higher or scientific, special and itinerant instruction for adults, and normal agricultural instruction. The provisions of the law of December 21, 1901, with reference to agricultural instruction now in force are stated, from which it appears that the present organization corresponds almost completely with the plan outlined by the author with the exception that the itinerant instruction is provided for as a secondary function of the regional agronomes or the experiment stations, and no provision is made for the normal agricultural instruction.

Correlation of industrial and academic subjects in rural schools, ELLA G. AGNEW (*Hampton Leaflets*, 6 (1912), No. 6, pp. 8).—This leaflet has been compiled for the use of rural teachers, especially those in whose schools canning clubs are to be organized. The author describes the preparation of the cold frame and suggests how the growing of tomatoes may be correlated with the work in manual training, language, composition, spelling, drawing, arithmetic, soils in relation to agriculture, and physiology.

Forestry in agriculture, E. R. JACKSON (*Vocational Ed.*, 1 (1912), No. 3, pp. 184-192, figs. 5).—An outline is here given of a one month's course in elementary forestry, given last spring in the Baltimore County Agricultural High School as a part of the course in farm crops. The course included recitations, field trips to a nearby woodlot, and studies of forest and woodlot conditions in the vicinity.

Forestry in geography, E. R. JACKSON (*School Sci. and Math.*, 12 (1912), No. 4, pp. 271-277).—In this address, which was delivered at the 1911 session of the summer school of the University of Virginia, the meaning of geography, distribution and character of forests in the United States, national forests and national parks, the influence of forests upon topography, relations of forests to commerce, and the lesson of conservation, are considered.

The text-book of agricultural education and rural life: Agricultural words (*Columbus, Ohio: Assoc. Adv. Agr. Ed.* [1912], pp. 29).—This is a list of words commonly used in the teaching and practice of agriculture, and is intended to form the basis for the agricultural spelling contests conducted under the auspices of the Ohio Association for the Advancement of Agricultural Teaching.

A practical course in botany, ELIZA F. ANDREWS (*New York, Cincinnati, and Chicago* [1911], pp. IX+374, pls. 15, figs. 511).—In preparing this high school text-book of botany the author's aim was "to bring the study of botany into closer touch with the practical business of life by stressing its relations with agriculture, economics, and, in certain of its aspects, with sanitation."

The materials selected for experiment and illustration are those which are familiar and easily obtained, largely of the common cultivated kinds of plants. The study begins with the seed, follows with germination and growth, and then proceeds with roots, stems, and the other parts of the plant, the response of the plant to its surroundings, closing with a chapter on cryptogams and a very brief consideration of systematic botany.

The book contains numerous practical questions, many suggestions for field work, and outlines for 86 experiments.

Experiments with soils, J. W. HUNGATE (*Dept. Agr. State Normal School [Cheney, Wash.]*, Bul. A, No. 1, 1912, pp. 16, figs. 2).—This bulletin has been prepared to assist the rural teacher in presenting in a very elementary way

the subject of soils and their care. Lists of laboratory equipment, references to useful soil literature, and 16 exercises on soils are given. Most of the exercises are followed by a brief discussion of the main principle involved.

A seventh grade soil experiment, C. F. PHIPPS (*Nature-Study Rev.*, 8 (1912), No. 4, pp. 154-156).—A simple experiment in soil analysis is described which may be used in the seventh grade to correlate its science work with that of previous grades.

Manual of laboratory exercises in farm crops, M. L. FISHER (*Lafayette, Ind.: Purdue Univ.*, 1911, pp. 16).—These exercises are the results of several years of trial in the laboratory of exercises suited to the lectures accompanying 2 of the agronomy courses in Purdue University. The exercises include a study of vitality of seeds of different ages, determining the pure and germinable seed in a sample, an introductory study of clover and weed seeds, determining the percentage of hull in different varieties of oats, a study of mature wheat, rye, barley, emmer, and speltz heads, and the mature plant of oats, effect of temperature on germination, field study of clovers and grasses, inspection of field plats, identification of weeds and weed seeds, determination of moisture in grain, comparative grain judging, and commercial seed testing.

Corn (*W. Va. School Agr.*, 2 (1912), No. 7, pp. 133-161, figs. 18).—This bulletin discusses the history and types of corn, improvement of the crop, cultural methods, testing seed corn, selecting seed corn in the field, judging and scoring corn, some injurious insects, and corn products. A practicum is outlined and supplementary references for the further study of corn are given.

The study of birds with a camera, R. W. HEGNER (*Nature-Study Rev.*, 8 (1912), No. 4, pp. 132-137, figs. 3).—The methods employed in photographing birds' nests and adult wild birds to prove the no elaborate apparatus or exceptional skill are necessary to obtain first-class results.

Alabama Bird Day book (*Montgomery, Ala.: Dept. Game and Fish*, 1912, pp. 64, pls. 10).—This book contains a suggested program for Bird Day, bird poems, and brief studies of birds' eggs and of birds found in Alabama.

Suggestions for crayfish study, MARGARET W. TAGGART (*Nature-Study Rev.*, 8 (1912), No. 3, pp. 104-110, fig. 1).—This is a study of the crayfish, followed by a series of 15 problems on collecting the crayfish, its habits, etc.

The insect life of pond and stream, P. S. WELCH (*Nature-Study Rev.*, 8 (1912), No. 4, pp. 139-144, figs. 5).—This article gives instructions as to where and when to collect water insects, how to make observations of these insects in their native haunts, general methods of collecting, necessary collecting apparatus, and general methods of rearing, including directions for making and caring for aquariums for insects living in quiet water and those living in running water.

The horse, A. W. NOLAN (*W. Va. School Agr.*, 2 (1912), No. 5, pp. 91-109, figs. 7).—This bulletin comprises 6 lessons on breeds and types of horses, judging a horse, feeding and care of horses, good horsemanship, and diseases of the horse. Some of the lessons include practical exercises.

Sheep and swine, A. W. NOLAN (*W. Va. School Agr.*, 2 (1912), No. 6, pp. 113-129, figs. 9).—This bulletin contains 8 lessons, together with practical exercises, on the history and breeds of sheep, judging, care and feeding of sheep, care of lambs, and swine history, types and breeds and feeding and management.

Annual report, 1911, Winnebago County schools, O. J. KERN (*Ann. Rpt. Winnebago Co. [Ill.] Schools*, 1911, pp. 96, figs. 101).—The author compares the cost of the Seward and Harlem consolidated schools with that of the other schools of the county, and describes some features of their work. Other chapters are devoted to outdoor and indoor improvement and nature-study agriculture, including reports of school garden activities in the spring of 1911, the work of

the Rockford soil experiment field, boys' corn and judging contests, and organizations in Winnebago County for country life.

A school for colonial science, A. GRADENWITZ (*Sci. Amer. Sup.*, 73 (1912), No. 1393, pp. 232, 233, figs. 6).—The author gives an illustrated account of the equipment and work of the German Colonial Academy at Witzzenhausen, the main object of which is to train pupils for the various economic pursuits open to the individual colonist.

The meaning of extension work, W. E. GARRISON (*Col. Rec. [N. Mex. Col. Agr.]*, 5 (1911), No. 2, pp. 1-4).—Extension work is discussed and the following forms are briefly described: Farmers' institutes; boys' and girls' clubs; demonstration work; lectures, conferences, and exhibits in connection with the county fair, etc.; short courses at the college; demonstration trains; and correspondence courses.

An act providing for agricultural extension in Indiana, G. I. CHRISTIE (*Purdue Univ., Dept. Agr. Ext. A. E. Form 14*, 1911, pp. 7).—The full text of the 1911 law, together with a discussion of those sections relating to county farmers' institutes, is given.

The boys' and girls' industrial club of New Mexico (*Col. Rec. [N. Mex. Col. Agr.]*, 5 (1911), No. 2, pp. 4-10).—An account is given of the history of the club, its purpose, contests, and prizes.

Constitution and suggestions for organizing county boys' and girls' industrial clubs of New Mexico (*Col. Rec. [N. Mex. Col. Agr.]*, 5 (1911), No. 2, pp. 11-14).

Constitution and directions for organizing local boys' and girls' industrial clubs of New Mexico, W. T. CONWAY (*Col. Rec. [N. Mex. Col. Agr.]*, 5 (1911), No. 2, pp. 15-17).

[Oklahoma boys' and girls' junior agricultural clubs] (*Bul. Okla. Agr. and Mech. Col.*, 7 (1910), No. 11, pp. 10; 8 (1911), Nos. 17, pp. 7, figs. 7; 18, pp. 15, figs. 9; 19, pp. 7; 20, pp. 15, figs. 10; 21, pp. 3; 22, pp. 16, figs. 14; 24, pp. 13, fig. 1; 8 (1912), Nos. 27, pp. 4; 28, pp. 4; 29, pp. 4, fig. 1; 30, pp. 4; 31, pp. 4; 32, pp. 4; 33, pp. 4; 34, pp. 4, figs. 2).—This series of bulletins is being published for the members of the Oklahoma Junior Agricultural Clubs, especially for contest work, and give instruction concerning plans for the organization of boys' and girls' agricultural clubs, sewing, cooking, butter making, milk testing and dairy herd records, poultry raising, growing cotton, corn, Kafir corn, milo maize, broom corn, vegetables, flowers, and peanuts, home canning, and hog selection and feeding.

Idaho potato culture clubs, W. H. OLIN (*Col. Agr., Univ. Idaho Ext. Bul. 1*, 1912, pp. 15, figs. 6).—Directions are given for the organization, as well as rules and regulations, of Idaho potato culture clubs.

Corn-growing contest for boys (*Penn. State Col., Dept. Agr. Ext. Circ.* (1911), pp. 4).—An outline for corn-growing contests in boys' organizations in cooperation with the Pennsylvania State College is suggested.

Results of Georgia boys' corn club work in 1911, J. P. CAMPBELL (*Bul. Univ. Ga.*, 1912, No. 175, pp. 24, figs. 6).—The author gives an account of the history of the corn club movement in Georgia, the promotion and maintenance of boys' corn club work, district organizers of corn clubs, and results for 1911.

The organization of girls' clubs, MARY E. CRESWELL (*Bul. Univ. Ga.*, 1912, No. 174, pp. 8, figs. 2).—Directions are given for organizing girls' canning and poultry clubs in Georgia in 1912.

Stock judging contests for boys at county fairs, D. O. THOMPSON (*Purdue Univ., Dept. Agr. Ext. Bul. 4*, 1912, pp. 12, figs. 6).—This is a suggested announcement as to the contests to be held cooperatively by Purdue University and county fair associations in Indiana.

County fair stock judging contests for boys, J. H. SKINNER and G. L. CHRISTIE (*Purdue Univ., Dept. Agr. Ext. Pamphlet*), pp. 4).—Rules, regulations, and other suggestions for conducting these contests are given.

County school fairs in Virginia, T. S. SETTLE (*Richmond, Va.: Dept. Pub. Instr., 1912, pp. 55, figs. 11*).—A typical county school fair is described and the history of the movement given. In 1911 there were 25 county fairs held, 10,000 school children competed for \$7,000 worth of prizes, and between 30,000 and 40,000 people attended. Detailed suggestions are made for conducting a county school fair, preparing premium lists for literary work, agriculture, home economics, manual training, and athletics, and preparing exhibits in the various classes, including score cards for judging the various articles exhibited.

Growing children in California gardens, C. A. STEBBINS (*Nature-Study Rev., 8 (1912), No. 2, pp. 67-74, figs. 2*).—An account is given of school garden work in the Ohio State Normal School, also of the plan of the University of California to make school life a copy of the community life.

Worcester garden city plan; or, the good citizens' factory, R. J. FLOOD (*Nature-Study Rev., 8 (1912), No. 4, pp. 145-150, figs. 3*).—This is a description of the garden city plan and an account of its development, object, and influence since it was started 5 years ago under the auspices of the Worcester Social Settlement in the "island district" of Worcester, Mass.

The garden city consists of a large group or city of little gardens, 10 by 20 ft., with streets, boulevards, squares, etc., like a miniature city. Dumps and vacant lots have been used. Each child is charged the sum of 5 cents for his garden, and given 5 packages of seeds and the ownership of all he raises. There are now 4 of these garden cities in which last season there were 1,000 young gardeners.

MISCELLANEOUS.

Twenty-second Annual Report of Alabama College Station, 1909 (*Alabama Col. Sta. Rpt. 1909, pp. 31*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1909, and reports of the director and heads of departments on the work of the station during the year.

Twenty-third Annual Report of Alabama College Station, 1910 (*Alabama Col. Sta. Rpt. 1910, pp. 32*).—This contains data corresponding to the above for the fiscal year ended June 30, 1910.

Twenty-fourth Annual Report of Colorado Station, 1911 (*Colorado Sta. Rpt. 1911, pp. 75*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1911, a report of the director on the work and publications of the station, and departmental reports, the experimental features of which are for the most part abstracted elsewhere in this issue.

Annual Report of Florida Station, 1911 (*Florida Sta. Rpt. 1911, pp. CVIII + XII, figs. 31*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1911, a list of the publications of the year, a general review of the work of the station during the year, departmental reports, and a list of the periodicals received by the station. Most of the experimental work reported is abstracted elsewhere in this issue.

Twenty-fourth Annual Report of Illinois Station, 1911 (*Illinois Sta. Rpt. 1911, pp. 16*).—This contains lists of the publications of the station since its establishment and during the fiscal year, a brief statement concerning the principal lines of work, and a financial statement for the fiscal year ended June 30, 1911.

Annual report of the director for the fiscal year ending June 30, 1911 (*Delaware Sta. Bul. 94, pp. 10*).—This contains the organization list and the report of the director on the work of the station. It includes a financial statement for the fiscal year ended June 30, 1911.

NOTES.

California Station.—Work has been begun on a laboratory building at the Citrus substation at Riverside, for which a state appropriation is available. Dr. J. E. Colt has been appointed director of the laboratory.

Connecticut College.—Dr. A. F. Blakeslee has been granted a year's leave of absence for research work on the lower fungi at the Carnegie Station for Experimental Evolution.

Hawaii College.—During the winter and spring months the college conducted a short course for teachers, including 15 special lectures on Monday afternoons. The maximum attendance was 50, the average 25.

Illinois University and Station.—New professorships have been authorized in landscape art, animal pathology, and dairy husbandry, also an associate and an instructor in landscape art. B. S. Pickett, of the New Hampshire College and Station, has been appointed assistant professor of pomology, and J. J. Gardner, also of the New Hampshire College and Station, as instructor in pomology. Dr. John Dettelson, of the Bussey Institution, has been appointed assistant professor of a new division of genetics in the animal husbandry department, Dr. Walter E. Joseph, instructor in animal husbandry, and V. A. Place assistant in animal husbandry. Dr. Otto Rahn, of the Michigan College and Station, has been appointed assistant professor of bacteriology.

Kansas Station.—According to a note in *Kansas Farmer*, A. M. Ten Eyck has resigned as superintendent of the Fort Hays substation.

Kentucky University and Station.—Dr. M. A. Scovell, director of the college of agriculture and director of the station since its establishment, died August 15 after an illness of two weeks. An account of his career will appear in a later issue.

Massachusetts Station.—B. G. Southwick, a 1912 graduate of the college, has been appointed secretary to the director, vice H. J. Baker, whose resignation has been previously noted.

Minnesota University.—Returns from a blank form sent to each alumnus of the school of agriculture who graduated previous to 1909 show that of the 385 men responding, 225 are farming at the present time and the remainder engaged in 34 occupations. Of the 119 women heard from, 60 are housekeepers, 34 teachers, and the balance engaged in 8 other occupations.

Nebraska Station.—John A. Ratcliff has been appointed assistant in experimental agronomy, and has entered upon his duties.

Nevada University and Station.—President J. E. Stubbs has been granted a year's leave of absence, during which time he will make a trip around the world. Dean Lewers will be acting president in his absence.

E. A. Howes, formerly with the seed branch of the Canadian Department of Agriculture, has been appointed professor of agronomy and agronomist. Dairy instruction is to be begun in the university, and V. E. Scott, formerly with the Dunn County Agricultural School of Menomonie, Wis., has been appointed instructor in dairying.

New Hampshire College.—President W. D. Gibbs has resigned to engage in business, retiring September 1.

Cornell University.—Plans are nearing completion for the forestry building, which is expected to be ready for occupancy in the fall of 1913. A three-story and attic brick structure, 142 by 54 feet, is contemplated. The ground floor will contain laboratories for wood technology and a timber-testing room, and the remaining floors will be devoted to offices, class rooms, laboratories for forest mensuration and utilization, silviculture, and dendrology, a museum, herbarium, drafting rooms, etc.

The New York State Grange has contributed \$600 for 12 scholarships in the college of agriculture, which were recently awarded after a competitive examination held in each county to which members of the grange 17 years of age or over were eligible.

New York State Station.—Among recent changes are the resignation of Miss Minerva Collins as assistant botanist, and the following appointments: Walter O. Gloyer as associate botanist, Richard F. Keeler, Reginald C. Collison, and W. J. O'Brien as assistant chemists, Bentley B. Fulton as assistant entomologist, James R. Brew as assistant bacteriologist, and Mancel T. Munn as assistant botanist.

North Carolina College Station.—The extension department operated an agricultural train over the Atlantic Coast Line Railroad July 23 to August 8, in which live stock, drainage, and farm implements were the main features. A car of horses, cattle, and hogs, and a car of implements were taken from the college farm, and demonstrations in plowing and the laying of tile were given at each of the two stops made daily. The attendance during the trip was more than 10,000.

Dr. Burton J. Ray, assistant chemist, has accepted the professorship of chemistry in the Porto Rico College, where special attention is to be given to the development of courses in sugar chemistry.

Ohio State University.—Dr. H. A. Weber, professor of agricultural chemistry since 1884, died June 14, at the age of 67 years. Prof. Weber received his undergraduate education at Otterbein University and in Germany, and was given the degree of Ph. D. from Ohio State University in 1879. Among other offices which he held during his long career were those of assistant chemist in the Ohio Geological Survey from 1869 to 1874, professor of chemistry in the University of Illinois from 1874 to 1882, chemist to the Illinois state boards of agriculture and health during the same period, and chemist to the State Dairy and Food Commission of Ohio from 1884 to 1897. He was also a member for several years of the committee on food standards of the Association of Official Agricultural Chemists.

Together with the late Director M. A. Scovell, Dr. Weber worked on the production of sugar from sorghum in 1883, and also studied at an early date, among other questions, the needs of soils for fertilizers, light as a factor in sugar production, and the development of root tubercles in water cultures. He was the author of *Select Courses in Qualitative Analysis*, the first edition of which appeared in 1871, and had also contributed to various chemical publications.

Pennsylvania College and Station.—W. J. Wright has resigned as instructor in horticulture and horticulturist to accept the directorship of the New York State School of Agriculture at Alfred.

South Dakota College and Station.—The appointment is noted of H. E. Endmann as assistant in dairying.

Tennessee University and Station.—According to a recent issue of the *Southern Agriculturist*, the Southern Railway, in conjunction with the Virginia & Southwestern Railway, the Cincinnati, New Orleans & Texas Pacific Railway, and the Mobile & Ohio Railroad, has established three agricultural scholarships

in the university of \$300 a year for four years. The recipients must be from farms in a county traversed by the Southern Railway system, must be in need of financial assistance, and must agree to practice or teach agriculture for two years after graduation in territory contiguous to some line of the system.

At the suggestion of the station authorities the railroads have this summer been operating excursions from the various counties of east Tennessee to the station to give farmers an opportunity to become familiar with its work. These excursions have proved very successful.

Oscar Campbell has been appointed plat assistant at the West Tennessee substation, and G. L. Herrington has been appointed horticultural assistant.

Utah College.—L. A. Merrill, director of the extension division, has resigned to engage in commercial practice as an agricultural expert. The offices of the extension division were transferred from Salt Lake City to Logan September 1.

Virginia Truck Station.—P. T. Cole, assistant horticulturist, has resigned to become assistant agricultural commissioner to the St. Louis Southwestern Railway Company, with headquarters in St. Louis.

Agriculture at Syracuse University.—Announcement is made by the division of agriculture, established about a year ago in response to the demand "under which every progressive university is put to offer the opportunity for instruction in agriculture as part of a liberal and technical education," of courses in general agriculture, animal husbandry, dairying, horticulture, agricultural engineering, and a special course for teachers. F. W. Howe, formerly of this Office, is director of the division.

General Agricultural Committees of Bankers' Associations.—Over 200 delegates, representing the agricultural committees of the bankers' associations of 22 States, met at Minneapolis and St. Paul August 7 and 8 for a discussion of agricultural education and improvement. Among the speakers were Thomas P. Cooper, secretary of the North Dakota Farming Association. President A. M. Soule, of the Georgia College; J. J. Hill; A. V. Storm, of the University of Minnesota; and S. M. Jordan, manager of the Pettis County Bureau of Agriculture, of Sedalia, Mo., all of whom discussed various phases of extension work.

A silver trophy offered to the State committee making the largest contribution to agricultural education and improvement was awarded to that of North Dakota, where the committee reported financing the better farming association to the extent of \$45,000, also contributing \$5,000 for farmers' institutes in the absence of a State appropriation, and \$5,000 for holding local corn-growing contests, in which over 11,000 men and boys participated. Joseph Chapman, jr., and Charles R. Forst, both of Minneapolis, were reelected president and secretary, respectively, for the ensuing year.

Illinois Country Life Conference.—A state conference on country life was held at De Kalb, Ill., August 1 and 2, which called together representatives of every type of rural organization and discussed all phases of country life. A most unique and helpful feature of this conference was a country life exhibit, to which many local and national organizations contributed. The conference was the second annual meeting of the Illinois Federation for Country Life Progress, a State-wide organization designed to unite all rural progress agencies of Illinois in one large, comprehensive campaign for the improvement of country life.

Second International Congress of Entomology.—This congress was held at Oxford August 5 to 9 under the presidency of Prof. E. B. Poulton and with representatives of about 20 countries in attendance.

In the section of economic entomology a paper was presented by Sir Daniel Morris, on behalf of H. A. Ballou, on Some Entomological Problems of the West Indies, with particular reference to insect control through the introduction of parasites. A. G. L. Rogers discussed the question of quarantine regulations, and his proposal of an international commission in connection with the International Institute of Agriculture met with the approval of the congress.

The next congress is to be held in Vienna in 1915, under the presidency of Prof. Anton Handlirsch.

International Association of Poultry Instructors and Investigators.—The first conference of this association took place in London July 18 to 24, with 27 countries represented. Lord Lucas, parliamentary secretary of the board of agriculture and fisheries, welcomed the delegates on the part of the British Government, and stated that the establishment of a national poultry institute for the scientific study of questions related to poultry husbandry and where instructors for the county work may be trained was receiving consideration.

A permanent organization was effected, E. Brown, of London, England, being chosen president, and Dr. Raymond Pearl, of the Maine Station, secretary.

A resolution was adopted providing for holding in 1914 a world's poultry congress, representing all sections of the industry. The association voted to institute fellowships to be conferred on such persons as shall have rendered service of the highest distinction to the advancement of the poultry industry. These fellowships are to be conferred by vote of the entire association, and are restricted in number to five every three years.

A central bureau of information is to be established, located for the present in London, and to contain an historical section, illustrative material, etc. The publication of a journal is also contemplated.

American Association of Instructors and Investigators in Poultry Husbandry.—At the fifth annual meeting of the International Association of Instructors and Investigators in Poultry Husbandry, in connection with the recent session of the Graduate School, a change of name to American Association of Instructors and Investigators in Poultry Husbandry was adopted. Horace Atwood, of the West Virginia University and Station, was elected president; J. C. Graham, of the Massachusetts College, and H. L. Kempster, of the University of Missouri, vice presidents; and Homer W. Jackson, of Buffalo, N. Y., secretary-treasurer.

Miscellaneous.—Charles H. T. Townsend has been appointed in charge of the Estación de Entomología, which will comprise all government entomological work in Peru, and will have its headquarters at Lima. E. W. Rust, who has been associated with Mr. Townsend, is to remain at Puirá in charge of a substation to combat cotton plagues.

M. A. Carleton, for the past 18 years in charge of the grain investigations of this department, has been given charge of the work of the Pennsylvania Chestnut Tree Blight Commission.

S. A. Bedford has succeeded J. J. Golden as deputy minister of agriculture for Manitoba.

Walter Morrison has made a third gift of \$50,000 to Oxford University for the promotion of agricultural work.

King George V has conferred the honor of knighthood on Harry James Veitch for distinguished work in horticulture.

